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### Comparison of Evidence-Based Practices for Students with Autism Spectrum Disorder

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## *Comparison of Evidence-Based Practices for Students with Autism Spectrum Disorder*

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### *Abstract*

The Every Student Succeeds Act (ESSA, 2015) reinforces and clearly defines the requirement of school districts to use evidence-based practices (EBPs) to improve student outcomes. The ESSA requires schools to find, evaluate, and implement effective EBPs that support high-quality learning for all students, including those with autism spectrum disorder (ASD). It is necessary for teachers to use identified EBPs when developing individualized education programs and providing necessary interventions for students with ASD. The purpose of this article is to: (a) examine EBPs determined by two national organizations (i.e., National Professional Development Center, National Standards Project Phase 2), (b) compare overlapping EBPs to determine their effectiveness for students with ASD, and (c) make recommendations for educators and other school professionals teaching students with ASD in school settings. Identification and implementation of EBPs is essential for teachers who work with students with ASD to increase their academic and functional achievement and reach their fullest potential.

*Keywords:* ASD, autism, evidence-based practices, interventions

## *Comparison of Evidence-Based Practices for Students with Autism Spectrum Disorder*

The Individuals with Disabilities Education Act (IDEA, 2004) and Every Student Succeeds Act (ESSA, 2015) reinforce and clearly define the requirement of using evidence-based practices (EBPs) to improve student outcomes. Evidence-based practices are defined as treatments or approaches that have been found effective through replicated research (Boutot, Raulston, & Dukes, 2017). Although multiple interventions are available to support students with autism spectrum disorder (ASD) in school settings, careful consideration is required to discern which practices are considered evidence-based. In accordance with federal law, educators are required to use research-based interventions, or those with evidence of effectiveness from publications in peer-reviewed journals (IDEA, 2004; Yell, 2016). IDEA specifically mandates that the IEP include special education and related services derived from peer-reviewed research, and the ESSA (2015) requires school districts to use EBPs showing a statistically significant effect on student outcomes (ESSA, 2015). That is, in order to promote in-school and post-school success of students with disabilities, educators must use strategies that have been shown to be effective through replicated research. The proper identification and implementation of EBPs is not only necessary but essential when it comes to the development of individualized intervention programs for students with ASD in order to support their academic and functional needs.

## *Autism Spectrum Disorder*

### **Definition of ASD**

According to the Centers for Disease Control and Prevention (CDC, 2018), ASD is one of the most commonly diagnosed disabilities for children in the United States and the fastest growing serious developmental disability that can cause significant social, communication and behavioral challenges. Diagnostic and Statistical Manual of Mental Disorders (DSM-5) defines ASD in terms of two categories: persistent impairment in reciprocal social communication and social interaction, and restricted, repetitive pattern of behavior. The manual provides an algorithm for how many symptoms in each behavioral domain are necessary for a diagnosis, requires the specification of severity levels, and uses specifiers to describe comorbidities, such as language and intellectual impairments (Harker & Stone, 2014). Under DSM-5 criteria, individuals with ASD must show symptoms in the early developmental period; however, those symptoms may not fully manifest until social demands exceed limited capacities. It is important to acknowledge the current neurodiversity movement, which prefers to view individuals with ASD and other cognitive or neurological disabilities as people with normal human differences in behavior. The argument for neurodiversity is that ASD traits and characteristics viewed as abnormal and in need of correction should be included in the normal range of human behaviors ([AppliedBehaviorAnalysisEDU](#), 2018).

Contrary to clinical diagnoses, educational identification is designed to determine if a student is eligible for special education services under the category of *autism* according to criteria outlined in the IDEA. It should be noted that under the law, all types of ASD are classified under one term *autism*. According to IDEA (2004), *autism* means a developmental disability that significantly affects communication and social interaction. The IDEA criteria for autism eligibility include engagement in repetitive activities or stereotypic movements, resistance to environmental changes or changes in routines, and unusual sensory responses. In addition, IDEA requires an adverse effect on educational performance.

### **Prevalence and Characteristics of ASD**

The ASD prevalence rate increased from an average of 4 per 10,000 children in the mid-60s (Fombonne, 2005) to 1 per 59 in 2018 (CDC). Thus, schools are educating a greater number of students with ASD and are required to address the specific needs of these students and carefully plan appropriate interventions and support services. Students with ASD often have challenges with social interaction, communication, and restricted or repetitive behaviors, interests, or activities. Research indicates that among individuals with ASD, difficulties with social interactions persist across the lifespan (Mackay, Knott, & Dunlop, 2007; Wehman et al., 2014) and tend to increase with age without effective intervention (Howlin, Mawhood, & Rutter, 2000).

In this article, the authors examined the identified EBPs with an emphasis on practices appropriate for individuals birth to 22 years of age aimed to facilitate their academic and functional growth while attending to their social and emotional needs. First, the authors examined effective EBPs for students with ASD as reported by the National Professional

Development Center (NPDC) and the National Standards Project, Phase 2 (NSPP2) and identified common trends. Then, the authors present recommendations specific to school settings for educators and other education practitioners working with students with ASD. The purpose of this article is to: (a) examine EBPs determined by two national organizations (i.e., NPDC, NSPP2); (b) compare overlapping EBPs to determine their effectiveness for students with ASD; and (c) make recommendations for educators and other school professionals teaching students with ASD in school settings.

### *Organizations*

Research on EBPs for individuals with ASD is dynamic and evolving. There have been several reviews of existing literature to determine what strategies and programs are evidence-based supported (e.g., Odom, Collet-Klingenberg, Rogers, & Hatton, 2010; Wong et al., 2015). Organizations such as the NPDC (2014) and the NSPP2 (2015) have reported on EBPs used in school settings for students with ASD. Overall, both organizations provide an abundance of information related to EBPs for individuals with ASD. The existing plethora of research creates difficulties for practitioners tasked with identification and implementation of EBPs. The ability to access accurate information about EBPs is essential to teachers and other education practitioners.

#### **National Professional Development Center on ASD**

Families, educators, and service providers are constantly bombarded by a massive amount of confusing and often conflicting information about the myriad treatments available to individuals with ASD. The NPDC on ASD was funded by the Office of Special Education Programs in the US Department of Education to promote the use of EBPs for individuals with ASD, birth to 22 years of age. The work of the NPDC was a collaboration among three universities: the University of North Carolina at Chapel Hill, the University of Wisconsin at Madison, and the MIND Institute, University of California-Davis. The NPDC had examined the current literature and identified focused interventions that teachers and other practitioners can easily access and utilize in teaching specific skills and concepts to students with ASD (Odom et al., 2010). The NPDC defined EBPs as interventions that have been proven to be effective (i.e., supported by research) and used their own criteria for evaluation when reviewing peer-reviewed research in scientific journals to reported on 27 EBPs for children with ASD (NPDC, 2014).

The NPDC (2014) created criteria to classify and establish interventions as EBPs for use in schools for individuals with ASD. Inclusion criteria for studies were as follows: (a) participant's age 0 to 22 years; (b) diagnosed with ASD; (c) intervention had to be behavioral, developmental, or educational; (d) method design had to compare an experimental condition to a control; and (e) intervention practices had to generate behavioral, developmental, or academic outcomes. Furthermore, research had to consist of either: (a) two high quality experimental or quasi-experimental group design studies conducted by at least two different researchers or research groups; (b) five high quality single subject design studies conducted by three different investigators or research groups and having a total of at least 20 participants across studies; or (c) one high quality randomized or quasi-experimental group design study and at least three high quality single subject design studies conducted by at least three different investigators or research groups. By using these criteria, the NPDC determined 27 EBPs for individuals with ASD (see Table 1).

Table 1  
*NPDC Evidence-based Practices*

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NPDC Evidence-based Practices
Antecedent-based Intervention
Cognitive Behavioral Intervention
Differential Reinforcement of Alternative, Incompatible or Other Behavior
Discrete Trial Training
Exercise
Extinction
Functional Behavior Assessment
Functional Communication Training
Modeling
Naturalistic Interventions
Parent-implemented intervention
Peer-mediated instruction and intervention
Picture Exchange Communication System
Pivotal Response Training
Prompting
Reinforcement
Response Interruption/ Redirection
Scripting
Self-management
Social Narratives
Social Skills Training
Structured Play Group
Task Analysis
Technology-aided Instruction and Intervention
Time Delay
Video Modeling
Visual Support

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**National Autism Center, National Standards Project, Phase 2**

At the same time the NPDC was releasing their report, the National Autism Center, funded by individual donations and grants, initiated its mission to provide leadership and resources to practitioners, families, and policymakers. The agency developed the National Standards Project which helps to reduce the resulting turmoil and uncertainty by addressing the need for EBP standards and provides guidelines for how to make correct choices about interventions (2015). The National Standards Project, Phase 1 (2009) and NSPP2 (2015), help with identification of EBPs for individuals with ASD. Phase 1 examined and quantified the level of research supporting interventions that target the core characteristics of students (below 22 years of age) with ASD. Phase 2 provides an update to the literature and also included studies evaluating interventions for adults (i.e., over 22 years), which have never previously been systematically reported (NSPP2, 2015).

**Scientific Merit Rating Scale.** The Scientific Merit Rating Scale (SMRS) was developed by the National Autism Center as a means to objectively evaluate if the methods used in each investigation were strong enough to determine whether or not an intervention was effective for individuals with ASD (NSPP2, 2015). The SMRS involves five dimensions of rigor that can be applied to determine the extent to which interventions are effective. They are: (a) research design, (b) measurement of the dependent variable, (c) measurement of the independent variable, (d) participant ascertainment, and (e) generalization and maintenance (NSPP2, 2015). See Table 2 for a definition of the SMRS dimensions.

Table 2  
*Scientific Merit Rating Scale*

Scientific Merit Rating Scale					
Score	1	2	3	4	5
Dimension of Rigor	Experimental Control	Measurement of the Dependent Variable	Measurement of Independent Variable	Participant Ascertainment	Generalization and Maintenance
Example	Number of participants and/or groups  Extent to which attrition or intervention disruption occurred  Type of research design employed	Type of measurement system used  Psychometric support and/or reliability  Extent to which evaluators were blind and/or independent	Implementation accuracy  Percentage and type of sessions during which data were collected  Extent to which intervention fidelity was reliably measured	Degree to which well-established diagnostic tools and procedures were used  Eligibility for participant inclusion  Extent to which diagnosticians and evaluators were independent to the intervention conditions	Extent to which researchers attempted to objectively demonstrate the spread of interventions effects across time, settings, stimuli, responses, or persons

For each of the five dimensions, a score between zero and five was assigned (i.e., 0 representing a poor score; 5 representing a strong score). The dimension scores were combined to produce a composite score that was rounded to the nearest whole number, which was called the SMRS score. The formula for combining these dimensions is as follows: Research Design (.30) + Dependent Variable (.25) + Participant Ascertainment (.20) + Procedural Integrity (.15) + Generalization and Maintenance (.10; NSPP2, 2015).

SMRS scores of 3, 4, or 5 indicate that adequate scientific rigor has been applied (NSPP2, 2015). Therefore, these interventions are categorized as being “Established” for individuals with ASD. SMRS scores of 2 are categorized as “Emerging” meaning more rigorous research must be conducted to confirm intervention results for individuals with ASD. SMRS scores of 0 or 1 provide insufficient evidence and are categorized as “Unestablished.” Further research is necessary to investigate the effectiveness of these interventions for individuals with ASD (NSPP2, 2015). Through the SMRS, the NSPP2 determined 14 “Established” EBPs and 18 “Emerging” interventions that are acceptable for individuals with ASD (see Table 3).

Table 3  
*NSPP2 Emerging and Established Evidence-based Practices*

NSPP2 Established Evidence-based Practices	NSPP2 Emerging Evidence-based Practices
Behavioral Interventions	Augmentative and Alternative
Cognitive Behavioral Interventions	Communication Devices
Comprehensive Behavioral Treatment for Young Children	Developmental Relationship-based Treatment
Language Training	Exercise
Modeling	Exposure Package
Natural Teaching Strategies	Functional Communication Training
Parent Training	Imitation-based Intervention
Peer Training Package	Initiation Training
Pivotal Response Training	Language Training (Production & Understanding)
Schedules	Massage Therapy
Scripting	Multi-component Package
Self-management	Music Therapy
Social Skills Package	Picture Exchange Communication System
Story-based Interventions	Reductive Package
	Sign Instruction
	Social Communication Intervention
	Structured Teaching
	Technology-based Intervention
	Theory of Mind Training

## ***Results***

Given the prevalence of ASD, educators are faced with an increasingly challenging task of ensuring that students with ASD benefit academically and socially. Thus, determining effective interventions and practices for working with students with ASD is imperative. Although the use of EBPs is federally mandated, the process of identification and implementation can be difficult for educators and other school professionals responsible for academic and functional achievement for individuals with ASD. The purpose of this article was to compare EBPs determined by two national organizations (i.e., NPDC, NSPP2) as effective for students with ASD and make recommendations for educators and other school professionals working with students with ASD in school settings.

### **Overlapping EBPs**

The NPDC and the NSPP2 have both identified EBPs through extensive literature reviews using different evaluation processes and criteria. Overall, 27 EBPs were categorized by the NPDC as evidence-based; 14 established and 18 emerging EBPs were identified by the NSPP2. This investigation has identified 18 instructional practices for students with ASD that both organizations (i.e., NPDC, NSPP2) have identified as evidence-based. While some differences in conceptual findings do exist, there is a substantial agreement between the two organizations as evidenced in Table 4.



Table 4  
*Comparison of Established Evidence-based Practices from NPDC and NSPP2*

NPDC Established Evidence-based Practices	NSPP2 Established Evidence-based Practices											
	Behavioral Interventions	Cognitive Behavioral Interventions	Modeling	Natural Teaching Strategies	Parent Training	Peer Training Package	Pivotal Response Training	Schedules	Scripting	Self- management	Social Skills Package	Story-based Interventions
Antecedent-based Intervention												
Cognitive Behavioral Intervention												
Differential Reinforcement of Alternative, Incompatible, or Other Behavior												
Discrete Trial Teaching												
Parent- implemented intervention												
Peer-mediated instruction and intervention												
Pivotal Response Training												
Prompting												
Reinforcement												

Response Interruption/Redirection												
Scripting												
Self-management												
Social Narratives												
Social Skills Training												
Task Analysis												
Time Delay												
Video Modeling												
Visual Support												

*Note.* Dark gray = NSPP2 and NPDC both consider established EBPs

The NPDC and NSPP2 have 18 instructional practices for students with ASD that both organizations have identified as evidence-based. The following definitions and examples are ways to incorporate these dually established EBPs into best teaching practices.

**Antecedent-based Intervention** – focus on two types of antecedent events: discriminant stimuli (events that serve as signals for behavior to occur) and establishing operations (events that alter the reinforcing properties of another event; Kern, Claire, & Sokol, 2002). A discriminant stimuli example may be displayed when a teacher assigns a difficult writing assignment. The student proceeds to destroy the math paper. As a consequence, the student is sent to the office. In this example, the destructive behavior is likely to continue in the future when undesirable writing assignments are presented in the future as it has allowed the student to escape the assignment. An example of establishing operations would be not eating breakfast. For example, a lengthy homework assignment may not be typically associated with temper tantrums. However, if a child has not eaten any breakfast, a lengthy assignment may result in a tantrum. Establishing operations typically occur at a time distant from problem behaviors. For more information on antecedent-based intervention see Kern et al. (2002).

**Cognitive Behavioral Intervention** – instruction on management or control of cognitive processes that lead to changes in overt behavior (Wong et al., 2015). Rather than attempting to control student behavior with external reinforcement (e.g., token economy system, praise for correct behavior), cognitive behavioral intervention teaches students to use their inner speech or self-talk. Cognitive strategies can help students learn how to think. For example, a student who struggles with addition may say “I can’t do math, it is too hard.” Using cognitive behavioral interventions, the teacher would help the student to change their self-talk to something more positive, such as “Math is challenging, but I will try my best. I am smart.”

**Differential Reinforcement of Alternative, Incompatible or Other Behavior (DRA/DRI/DRO)** – consists of withholding reinforcement for the challenging behavior and providing reinforcement for an appropriate alternative behavior, an incompatible behavior, or absence of the challenging behavior (Chazin & Ledford, 2016). A reinforcer is provided: (a) when the student is engaging in a specific appropriate/alternative desired behavior other than the inappropriate behavior (DRA); (b) when the student is engaging in a behavior that is physically impossible to do or incompatible while exhibiting the inappropriate behavior (DRI); or (c) when the student is not engaging in the interfering behavior (DRO; Wong et al., 2015). For example, the teacher could use planned ignoring until the student stops talking and then verbally praise him when he is listening. Listening is the alternative behavior the student has chosen to do instead of talking (DRA; Lavay, French, & Henderson, 2016). Then, if a student is talking while the teacher is giving instructions or during independent work, the teacher could reinforce following the talk/movement rules (DRI; Scheuermann & Hall, 2016). Finally, the teacher could reinforce for increasingly longer periods of time during which no off-task talking occurred (DRO; Scheuermann & Hall, 2016). For further information on differential reinforcement see Cooper, Heron, and Heward (2007).

**Discrete Trial Teaching** – one-to-one instructional approach that teaches skills using prompting

and reinforcement in a planned, controlled, and systematic manner (Neitzel, 2010). Positive praise and tangible rewards are used to reinforce desired skills and behaviors. For example, the teacher may ask a student to identify shapes using discrimination training by pointing to either the circle or square followed by a consequence (e.g., verbal praise) from the teacher for a correct (e.g., “Great, you found the square”) or incorrect response (e.g., “No, please try again”). For additional information on discrete trial teaching, see Leaf, Cihon, Leaf, Mceachin, and Taubman (2016).

**Parent-implemented intervention** – intervention provided by parents to their child to improve a wide variety of skills and/or reduce interfering behaviors. Parents learn to deliver interventions in their home and/or community through a structured parent training program (Wong et al., 2015). Parents are taught how to embed strategies to support social communication throughout everyday activities. For example, parents are instructed how to help initiate social interaction in a grocery store for their child.

**Peer-mediated instruction and intervention** – typically developing peers interact and/or help students with ASD to acquire new behavior, communication, and social skills by increasing social and learning opportunities within natural environments. Teachers and service providers systematically use peers-mediated strategies for engaging students with ASD in positive and extended social interactions in both teacher-directed and learner-initiated activities (Wong et al., 2015). For example, teachers can use a peer buddy program during physical education. Peer buddies would be trained on how to properly model skills, give specific feedback, and communicate with their peers with disabilities.

**Pivotal Response Training** – teaches students to respond to naturally occurring learning opportunities and to seek out such opportunities. It was developed to enhance four pivotal learning variables: motivation (e.g., interests, choices), responsiveness to multiple cues (e.g., avoidance of a singular focus), social initiations (e.g., asking questions, obtaining attention, asking for assistance), and self-regulation (e.g., self-monitor, self-evaluate, self-reinforce; Neitzel, 2010). Teachers can use pivotal response training activities such as art. For example, the teacher may hold two crayons in her hand and ask “Which color do you want?” When the child points to the crayon of his preference, the teacher will provide the cue “Red crayon” and the child repeats “Red crayon”. The teacher will continue varying her cues and expect imitative response from the child. For further information on pivotal response training, see Koegel and Kern Koegel (2006).

**Prompting** – verbal, gestural, or physical assistance given to learners to assist with acquiring or engaging in a targeted behavior or skill. Prompts are generally given by an adult or peer before or as a learner attempts to use a skill (Wong et al., 2015). For example, a verbal prompt would be telling the student “Throw the ball to the target overhand.” For a gestural prompt, the teacher would simply point to the target; this would serve as indication for the student to throw overhand. A physical prompt is physically guiding or touching the student to help her use the correct form for throwing the ball overhand.

**Reinforcement** – an event, activity, or other circumstance occurring when there is a presentation of a stimulus (consequence) immediately following a response (behavior) that results in an increased probability of the behavior in the future (Cooper, Heron, & Heward, 2007). For example, after appropriately pointing to the color blue, the teacher gives the student a high-five.

**Response Interruption/Redirection** – introduction of a prompt, comment, or other distracters when an interfering behavior is occurring that is designed to divert the student’s attention away from the interfering behavior and results in its reduction (Wong et al., 2015). The first step is to identify the interfering behavior, followed by baseline data collection, and implementation of the response interruption/redirection. For example, teachers can use redirection by providing an object to play with (e.g., tactile ball, play dough) when addressing stereotypical hand flapping behavior. Finally, the last step is to monitor the learner progress (Texas Education Agency, 2015). For further information on response interruption/redirection see Ahearn, Clark, MacDonald, and Chung (2007).

**Scripting** – a verbal and/or written description about a specific skill or situation that serves as a model for the student. Scripts are usually practiced repeatedly before the skill is used in the actual situation (Wong et al., 2015). For example, the teacher begins scripting by giving the student a choice: “Do you want the red or blue Lego?” (Shanks, 2017). Then, the teacher moves the story forward with a suggestion of what can happen such as: “How about...,” “Maybe...,” “I wonder...”, or “How about stacking the blue Legos?” The teacher becomes the narrator who puts the story into words (e.g., “Wow, you picked blue Legos and stacked them to build a tower!”) and continues the process by offering an open-ended phrase (e.g., “Let’s see...what you can do next.”). The teacher could also use written scripting. For example, the teacher could give the student a cue card with a written script and ask to read it aloud. If the student fails to follow the teacher’s direction, he or she might be given a verbal prompt to do so.

**Self-management** – method in which learners are taught to monitor, record, and report data and reinforce their own behavior (Boutot, Raulston, & Dukes, 2017). There are two types of self-management systems: duration (interval system) and frequency (frequency system) of the behavior (Nietzel & Busick, 2009). Teachers can use an interval system to increase the duration that a desired behavior occurs (e.g., remaining in seat) or decrease the duration that an undesired behavior occurs (e.g., flapping hands). For example, teachers can help students learn how to use a timer, a device or a feature on their iPhone/iPad, and record the duration of staying in their seat or staying on task. To address the frequency of a behavior (e.g., raising hand in class), teachers should consider a frequency criterion. The self-recording device should be easy for learners to record their behaviors (e.g., checking yes or no; circling a smiley face or a frown face).

**Social Narratives** – narratives that describe social situations, including social stories, in some detail by highlighting relevant cues and offering examples of appropriate responding. Social narratives are individualized according to learner needs and typically are quite short, perhaps including pictures or other visual aids (Wong et al., 2015). For example, a social narrative could be constructed detailing the steps necessary for walking through the hallway (e.g., quiet voices, hands to self).

**Social Skills Training** – group or individual instruction designed to teach students with ASD ways to appropriately interact with peers, adults, and other individuals. Most social skill meetings include instruction on basic concepts, role-playing or practice, and feedback to help learners with ASD acquire and practice communication, play, or social skills to promote positive interactions with peers (Wong et al., 2015). A teacher can use role-playing with scripted and unscripted elements to teach interaction skills involving initiation, responding, and termination of interactions. For example, a student can be provided with a scenario and an opportunity to practice initiating a conversation with another student or an adult.

**Task Analysis** – a process in which an activity or behavior is divided into small, manageable steps in order to assess and teach the skill. Other practices, such as reinforcement, video modeling, or time delay, are often used to facilitate acquisition of the smaller steps (Wong et al., 2015). For example, when teaching how to perform an underhand toss, the task analysis steps are: (a) face the target; (b) step with the opposite foot towards the target (i.e., if throwing with right hand, step towards target with left foot); (c) use a pendulum arm motion with the throwing arm (e.g., “tick tock like a clock”); and (d) follow through to the sky or ceiling with the hand doing the throwing.

**Time Delay** – in a setting or activity in which a learner should engage in a behavior or skill, a brief delay occurs between the opportunity to use the skill and any additional instructions or prompts. The purpose of the time delay is to allow the learner to respond without having to receive a prompt and thus focuses on fading the use of prompts during instructional activities (Wong et al., 2015). There are two types of time delay procedures: progressive and constant (Nietzel, 2009). With progressive time delay, as the student becomes more proficient at completing a skill (e.g., writing name), the teacher gradually increases the waiting time between the instruction and the prompt (e.g., pick up pencil). Progressive time delay prompts have multiple levels; regardless of the number of levels, it is always started with a zero second delay. After a predetermined number of trials with a zero second delay, the time between the instruction and prompt is gradually increased until a maximum delay interval is reached (Grattan & Demchak, n.d.). Similar to progressive time delay, with constant time delay, there is no delay between the instruction and prompt when a student is first learning a skill. The teacher can use a fixed amount of time between the instruction and the prompt as the student becomes more proficient at the new skill. For more information on time delay strategies, see Walker (2008).

**Video Modeling** – a visual model of the targeted behavior or skill (typically in the behavior, communication, play, or social domains), provided via video recording and display equipment to assist learning in or engaging in a desired behavior or skill (Wong et al., 2015). For example, the teacher can show a video of a peer model maturely demonstrating how to dribble a basketball (e.g., fingertips only, ball at waist level). It is necessary for the model to demonstrate the skill at a mastery level as what the student is shown is what he will replicate (Bittner, Silliman-French, Myers, & Nichols, 2018). After viewing the video, the teacher will hand a basketball to the student and ask him to dribble.

**Visual Support** - any visual display that supports the student engaging in a desired behavior or skills independent of prompts. Visual supports include pictures, written words, objects within the environment, arrangement of the environment or visual boundaries, schedules, maps, labels,

organization systems, and timelines (Wong et al., 2015). For example, the teacher can use a pictorial representation of a student's daily schedule (e.g., table time, physical education, reading, lunch, work station, break, life skills room).

### ***Discussion***

Under current policy, educators are expected to select and implement strategies demonstrated by research as effective for individuals with ASD. The purpose of this article is to: (a) examine EBPs determined by two national organizations (i.e., NPDC, NSPP2); (b) compare overlapping EBPs to determine their effectiveness for students with ASD; and (c) make recommendations for educators and other school professionals teaching students with ASD in school settings. The identified set of EBPs, which have been accepted as established practices by both organizations, is a tool that educators can use in developing an intervention program for students with ASD. Educators are encouraged to use established EBPs because there is sufficient evidence that these EBPs are effective for individuals with ASD.

Better outcomes for students with ASD depend not only on selection and implementation of EBPs, but also on professional development and support for educators and other school professionals responsible for implementing the practices with fidelity. Educators need to know the core components of interventions and have the skills necessary for their effective implementation. However, teachers are often underprepared to effectively teach students with ASD due to the lack of professional development in university preparation and in-service training (Machalicek et al., 2008; Suhrheinrich, 2011). The brief descriptions of EBPs presented in this article should be used as a springboard by educators and other school professionals in furthering their knowledge and skills.

The resources described in this article are only a fraction of the existing resources designed to assist educators with selection and implementation of EBPs. Several websites provide information and materials to assist teachers in the implementation of EBPs. Educators may find helpful resources provided by the National Professional Development Center on ASD (<https://autismpdc.fpg.unc.edu/evidence-based-practices>), Autism Internet Modules (<http://www.autisminternetmodules.org/>), TEACCH Autism Program (<https://teacch.com/trainings/online-learning-opportunities/>), and National Autism Center (<http://www.nationalautismcenter.org/resources/for-educators/>). These website resources include an overview of the EBPs, step-by-step instructions for implementation, guidelines and checklists, training modules, and additional references pertinent to the EBPs.

### ***Limitations***

The results of the current study examining EBPs for students with ASD are limited by several factors. First, the aim of this study was to review EBPs reported by two reputable national organizations (i.e., NPDC and NSPP2), compare overlapping EBPs, and provide recommendations for practitioners on the use of reported EBPs in school settings. Thus, only EBPs reported by NPDC and NSPP2 were considered.

Second, each organization used their own criteria for evaluation when reviewing peer-reviewed research in scientific journals to reported on EBPs for children with ASD. Some differences occurred in the evaluation process and criteria, as well as in the definition and organization of EBPs. Perhaps, the main difference relates to existing discrepancies in terminology. For example, conceptual differences between prompt delay and time delay, and visual support and schedule remain uncertain. Furthermore, the NSPP2 uses the terminology “behavioral intervention” whereas the NPDC indicates nine separate intervention categories (see Table 4 for details). While the methods used by each organization were strong enough to determine whether or not an intervention was effective for individuals with ASD, the authors had no control over the validity of their instruments (e.g., the SMRS scale).

Third, this study review was not intended to be a comprehensive review of all literature related to EBPs for students with ASD. Therefore, the identified EBPs should not be interpreted as a complete list for addressing the needs of students with ASD. Finally, reported EBPs were described and supported by examples, but not addressed in great detail.

### ***Implications***

Despite such limitations, this study has several implications for research and practice. First, this study adds to previous research on EBPs for students with ASD. Drawing on relevant support from two national organizations, authors proposed a conceptual framework of critical EBPs for addressing the needs of students with ASD in school settings.

Further, the results of this study have implications for teachers and other school professionals teaching students with ASD. It is anticipated that these practitioners will explore reported EPBs for meeting the academic and functional needs of students with ASD and utilize them for creating individualized intervention programs for these students. Administrators also may be willing to explore new ways to support faculty who work with students with ASD through pertinent professional development.

### ***Future Directions***

Given the growing number of students with ASD in today’s schools, the need for additional research focused on effective practices for meeting their needs is highly important. First, additional research is needed to more deeply address each of the reported EBPs and describe



effective methods for implementation. Future research also should explore the impact of early implementation of EBPs in promoting success of students with ASD.

Second, future research should conduct a comprehensive evaluation of available literature on EBPs for students with ASD. It might be useful to analyze multiple EBP reports and compare their results. One important responsibility for future researchers is not only to conduct studies that meet high quality standards, but also to translate research to practice. Researchers should address the need for practical tools teachers working with students with ASD can utilize in their classrooms.

Third, future research should employ methods that provide insight on specific factors that contribute to EBPs for students with ASD. Specifically, it may be useful to explore the perceptions of teachers and other school professionals working with students with ASD regarding the EBPs they utilize to support students with ASD. Finally, researchers should evaluate training for teachers on practices found to be empirically validated for students with ASD and barriers to effective implementation of EBPs.

### ***Conclusion***

The ESSA (2015) requires schools to find, evaluate, and implement effective EBPs that support high-quality learning for all students with disabilities, including those with ASD. The ability to access accurate information about EBPs is essential to teachers and other education practitioners; however, the existing plethora of research on EBPs creates difficulties for practitioners tasked with identification and implementation of EBPs. For this reason, it is important that practitioners are efficient in locating and incorporating EBPs then into their daily instruction to help students with ASD realize their full potential. In this article, authors placed the emphasis on identifying practices that are efficacious and useful for practitioners. Using strategies described in this article EBPs and provided resources, educators and other school professionals can assist with specific approaches for improving performance and achievement for students with ASD, increasing the likelihood of improved educational outcomes and enhanced quality of life for these students.

### ***References***

- Ahearn, W. H., Clark, K. M., MacDonald, R. P. F., & Chung, B. I. (2007). Assessing and treating vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis, 40*(2), 263-275.
- AppliedBehaviorAnalysisEDU (n.d.). *What is the neurodiversity movement and autism rights?* Retrieved from <https://www.appliedbehavioranalysisedu.org/what-is-the-neurodiversity-movement-and-autism-rights/>
- Bittner, M., Silliman-French, L., Myers, D., & Nichols, D. L. (2018). Effectiveness of instructional strategies on the motor performance of children with autism spectrum disorder. *Palaestra, 32*(2), 36-42.
- Boutot, E. A., Raulston, T. J., & Dukes, C. (2017). Evidence-based practices for educating students with Autism Spectrum Disorders. In E. A. Boutot (Eds.), *Autism spectrum*

- disorders: Foundations, characteristics, and effective strategies* (pp. 21-39). Upper Saddle River, N.J.: Pearson/Prentice Hall
- Callahan, K., Shukla-Mehta, S., Magee, S., & Wie, M. (2010). ABA versus TEACCH: The case for defining and validating comprehensive treatment models in autism. *Journal of Autism and Developmental Disorders*, 40(1), 74-88.
- Chazin, K. T. & Ledford, J. R. (2016). *Evidence-based instructional practices for young children with autism and other disabilities*. Retrieved from <http://vkc.mc.vanderbilt.edu/ebip/differential-reinforcement>
- Centers for Disease Control and Prevention (2018). *Autism Spectrum Disorders (ASD)*. Retrieved from <https://www.cdc.gov/ncbddd/autism/data.html>
- Cooper, H., Heron, T., & Heward, W. (2007). *Applied behavior analysis*. Upper Saddle River, NJ: Pearson Education.
- Every Student Succeeds Act of 2015, Pub. L. No. 114-95 114 § Stat. 117 (2015–2016)
- Fombonne, E. (2005). Epidemiology of autistic disorder and other pervasive developmental disorders. *Journal of Clinical Psychiatry*, 66 Suppl 10, 3-8.
- Grattan, J., & Demchack, M. A. (n.d.). *Tips for home or school: Progressive time delay prompting*. Retrieved from <https://www.unr.edu/ndsip/tipsheets/progressivetimedelayprompting.pdf>
- Harker, C., & Stone, W. (2014) *Comparison of the diagnostic criteria for Autism Spectrum Disorder across DSM-5, DSM-IV-TR, and the Individuals with Disabilities Act (IDEA) definition of autism*. Retrieved from <http://iris.peabody.vanderbilt.edu/wp-content/uploads/2014/09/ASD-Comparison-092214.pdf>
- Howlin, P., Goode, S., Hutton, J., & Rutter, M. (2004). Adult outcome for children with autism. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 45(1), 212–229.
- Individuals with Disabilities Education Improvement Act of 2004, P. L. No. 108-446, 20 U.S.C.
- Kern, L., Choutka, C. M., & Sokol, N. G. (2002). Assessment-based antecedent interventions used in natural settings to reduce challenging behavior: An analysis of the literature. *Education and Treatment of Children*, 25(1), 113-131.
- Koegel, R. L., & Kern Koegel, L. (2006). *Pivotal response treatments for autism: Communication, social, and academic development*. Baltimore, MD: Brookes Publishing Company.
- Lavay, B. W., French, R., & Henderson, H. L. (2016). *Positive behavior management in physical activity settings* (3rd ed.). Champaign, IL: Human Kinetics.
- Leaf, J. B., Cihon, J. H., Leaf, R., Mceachin, J., & Taubman, M. (2016). A progressive approach to discrete trial teaching: Some current guidelines. *International Electronic Journal of Elementary Education*, 9(2), 361-372.
- Machalicek, W., O'Reilly, M. F., Rispoli, M., Davis, T., Lang, R., Franco, J. H., & Chan, J. M. (2010). Training teachers to assess the challenging behaviors of students with autism using video teleconferencing. *Education and Training in Autism and Developmental Disabilities*, 45(2), 203-215.
- Mackay, T., Knott, F., & Dunlop, A. (2007). Developing social interaction and understanding in individuals with autism spectrum disorder: A group work intervention. *Journal of Intellectual and Developmental Disability*, 32(4), 279-290.

- National Autism Center (2009). *National Standards Project, Phase I*. Retrieved from <http://www.nationalautismcenter.org/national-standards-project/history/>
- National Autism Center (2015). *National Standards Project: Addressing the need for evidence-based practice guidelines for Autism Spectrum Disorders*. Retrieved from <https://mn.gov/mnddc/asd-employment/pdf/09-NSR-NAC.pdf>
- National Professional Development Center on Autism Spectrum Disorder (2014). *What criteria determined whether an intervention was effective?* Retrieved from <http://autismpdc.fpg.unc.edu/what-criteria-determined-if-intervention-was-effective>
- Neitzel, J. (2009). *Overview of time delay*. Chapel Hill, NC: National Professional Development Center on Autism Spectrum Disorders, Frank Porter Graham Child Development Institute, The University of North Carolina.
- Neitzel, J. (2010). Positive behavior supports for children and youth with Autism Spectrum Disorders. *Preventing School Failure, 54*(4), 247-255.
- Neitzel, J., & Busick, M. (2009). *Overview of self-management*. Chapel Hill, NC: National Professional Development Center on Autism Spectrum Disorders, Frank Porter Graham Child Development Institute, The University of North Carolina.
- Odom, S. L., Collet-Klingenberg, L., Rogers, S. J., & Hatton, D. D. (2010). Evidence-based practices in interventions for children and youth with autism spectrum disorders. *Preventing School Failure, 54*(4), 275-282.
- Sackett, D. L., Richardson, W. S., Rosenburg, W. M., & Haynes, R. B. (1997). *Evidence-based medicine: How to practice and teach EBM*. New York, NY: Churchill Livingstone.
- Shanks, B. A. (2017, November). Scripting: Out with the borrowed, and in with a new tale. *Autism Parenting Magazine*. Retrieved from <https://www.autismparentingmagazine.com/scripting-verbal-sharing-tips/>
- Scheuermann, B.K. & Hall, J.A. (2016). *Positive Behavioral Supports for the classroom*, (3<sup>rd</sup> Ed.). Boston, MA: Pearson.
- Suhrheinrich, J. (2011). Training teachers to use pivotal response training with children with autism: Coaching as a critical component. *Teacher Education and Special Education, 34*(4), 339-349.
- Texas Education Agency. (2015). *Response interruption/redirection*. Retrieved from <http://txautism.net/assets/uploads/docs/EBP-RIR.pdf>
- Walker, G. (2008). Constant and progressive time delay procedures for teaching children with autism: A literature review. *Journal of Autism and Developmental Disorders, 38*(2), 261-75.
- Wehman, P., Schall, C., Carr, S., Targett, P., West, M., & Cifu, G. (2014). Transition from school to adulthood for youth with Autism Spectrum Disorder: What we know and what we need to know. *Journal of Disability Policy Studies, 25*(1), 30-40. doi:10.1177/1044207313518071
- Wong, C., Odom, S. L., Hume, K. A., Cox, A. W., Fettig, A., Kucharczyk, S., . . . Schultz, T. R. (2015). Evidence-Based practices for children, youth, and young adults with autism spectrum disorder: A comprehensive review. *Journal of Autism and Developmental Disorders, 45*(7), 1951-1966.
- Yell, M. L. (2016). *The law and special education* (4<sup>th</sup> ed.). Upper Saddle River, NJ: Merrill/Prentice Hall

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