



Increasing engagement in students with autism in inclusion classrooms

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ABSTRACT

The benefits of inclusion classrooms for students with Autism Spectrum Disorders have been frequently acknowledged by parents, instructors, and professionals in education settings. However, despite the general support for inclusion classrooms, students with autism often struggle academically. Among some of the factors that contribute to this outcome are: problems of student motivation, ineffective consequences for academic behavior, and ineffective learning histories with the instructor and the classroom environment. We review and describe evidence-based practices relative to each of these problems, all of which can be implemented by educators or other professionals in a classroom setting. We provide a description of these strategies, and examples of how to incorporate them effectively into daily instructional activities to improve academic engagement in children with autism.

1. Introduction

In 1975, the U.S. Congress passed Public Law 94–142 which guaranteed equal access to education for students with disabilities. In 2004, amendments to that law sought to emphasize that all students should be provided with the adequate supports to pursue a career or to enter post-secondary education (IDEA, 2004). In the years since, there has been a steady increase in the placement of students with disabilities in general education classrooms in the U.S., and in recent years this trend has significantly increased (Ferraioli & Harris, 2010; McLeskey, Landers, Williamson, & Hoppey, 2010).

Inclusive education programs can be broadly defined as those which accommodate all learners in a mainstream classroom. In 2017, UNESCO defined inclusion as the process of overcoming the barriers limiting the participation of all learners. Their report states that any difficulties experienced by students in their learning process are due to the education system, including the methods of teaching, and the environments provided to support all students. Research findings support these assertions. Studies show that children with developmental delays make progress when exposed to grade-level content, when given the necessary supports and accommodations to learn that content (Browder, Spooner, Ahlgrim-Dezell, Harris, & Wakeman, 2008; Taub, McCord, & Ryndak, 2017). Prominently represented in this inclusion movement are students with autism spectrum disorder.

According to the U.S. Department of Education (40th report on the implementation of IDEA) the percentage of students with autism more than doubled between 2007 and 2016 (U.S. Department of Education

(2018) (2018), 2018). In 2002, 24.7% of the students with autism served under IDEA spent up to 79% of their school day in a regular education classroom (U. S. Department of Education, (2006) (2006), 2006). By contrast, in 2015, 18.7% of the students with autism spent between 40% and 79% of their school hours in inclusion classrooms while 62.5% spent 80% or more of their school hours in a general education classroom (U.S. Department of Education, National Center for Education Statistics, (2019) (2019), 2019).

The fact that an increasing number of students with autism are being included in regular education classrooms should not be surprising. Inclusion is beneficial not only to children with autism but also to children without special needs. Through inclusion classrooms, children with autism are exposed to stimulating environments that facilitate the development of social skills and problem-solving strategies, while children without special needs are more likely to engage in behaviors of acceptance, respect, and appreciation for diversity (Kretzmann, Shih, & Kasari, 2015; McCurdy & Cole, 2014; Santillan, Frederick, Gilmore, & Locke, 2019).

Early Intensive Behavioral Intervention (EIBI) is one of the most popular and requested researched-based interventions for students with autism (Granpeesheh, Dixon, Tarbox, Kaplan, & Wilke, 2009; Reichow, 2012). EIBI is a structured approach that uses the principles of Applied Behavior Analysis to decrease disruptive behaviors and increase cognitive and functional skills such as language and communication, self-care, and social skills. In this approach a certified behavior analyst designs a program tailored to the student's needs and skill level, with objectives based on measurable and observable mastery criteria. As its

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Table 1

Summary of evidence based practices used to improve academic engagement in children with autism.

Challenging area	Suggested strategies	Expected outcomes	Sources of empirical support
Motivation	Choice interventions	<ul style="list-style-type: none"> – Increased work completion – Increased compliance – Decreased time to onset of work activity – Decreased frequency of inappropriate behavior 	<ul style="list-style-type: none"> – Koegel et al. (2010) – Morgan (2006) – Ennis et al. (2019) – Lane et al. (2015) – Sullivan and Roane (2018) – Rispoli et al. (2013) – Reutebuch et al. (2015) – Tullis et al. (2011)
	Task Interspersal	<ul style="list-style-type: none"> – Higher opportunities to access reinforcement – Decreased frequency of problem behavior – Higher accuracy of responses – Increased overall task engagement – Strengthens mastered skills. 	<ul style="list-style-type: none"> – Benavides and Poulson (2009) – Bottini et al. (2019) – Calderhead et al. (2006) – Hawkins et al., 2005. – Pitts & Dymond, 2012 – Planer et al. (2018). – Rapp and Gunby (2016) – Skinner et al. (2002)
	ASR	<ul style="list-style-type: none"> – Increased opportunities to respond. – Decreased time in offtask behaviors. – Less frequency of problem behaviors or selfstimulatory behaviors. – Higher compliance – Higher frequency of correct responding 	<ul style="list-style-type: none"> – Haydon et al. (2013) – Nagro et al. (2016) – Rosenshine (2012) – Tincani (2011) – Twyman and Heward (2016)
Consequences for academic behavior	Preference and reinforce assessments	<ul style="list-style-type: none"> – Increased motivation – Decreased problem behavior – Increased rapport with instructor 	<ul style="list-style-type: none"> – Carr et al. (2000) – Deliperi et al. (2015) – DeLeon and Iwata (1996) – Fisher et al. (1992). – Pence et al. (2012) – Weldy et al. (2014).
	Self -management	<ul style="list-style-type: none"> – Decreased problem behavior – Increased independent functioning – Increased academic engagement 	<ul style="list-style-type: none"> – Carr et al. (2014) – Cihak et al. (2010) – Clemons et al. (2016) – Holifield et al. (2010) – Roberts et al. (2019)
Learning history with instructor	Pairing	<ul style="list-style-type: none"> – Reduced aversive reactions to tasks – Increased rapport with instructor – Increased academic engagement – Decreased problem behavior associated with the termination of instruction. 	<ul style="list-style-type: none"> – Kelly et al. (2015) – Lugo et al. (2017) – Lugo et al. (2018)
	Prompting and fading	<ul style="list-style-type: none"> – Increased opportunities for student's success – Decreased frustration with challenging tasks – Decreased frequency of problem behavior – Increased accuracy of responding 	<ul style="list-style-type: none"> – Heinrich et al. (2016) – Kurt and Tekin-Iftar (2008) – Mueller et al. (2007) – Severtson and Carr (2012) – Tekin-Iftar et al. (2017) – Waugh et al. (2011)
Learning history with setting	Visual activity schedules	<ul style="list-style-type: none"> – Decreased problem behavior during transitions – Decreased latency to task initiation – Increased independent functioning. 	<ul style="list-style-type: none"> – Knight et al. (2015) – Meadan et al. (2011) – Macdonald et al. (2018) – Pierce et al. (2013) – Van Laarhoven et al. (2010) – Waters et al. (2009) – Watson and DiCarlo (2016)
	Priming	<ul style="list-style-type: none"> – Reduced frequency of problem behavior – Increased participation in classroom and play activities. – Increased social engagement. 	<ul style="list-style-type: none"> – Cuvo et al. (2010) – Kamps et al. (1992) – Kim and Boradhead (2015) – Gengoux (2014) – Sawyer et al. (2005)

name describes, these programs require both an early start, and intensive implementation of behavioral programs with a minimum involvement of 20 h per week, over 2 or more years (Eldevik et al., 2009; Reichow, 2012).

Extensive research demonstrating EIBI's effectiveness across settings and cultures has established it as an evidence-based practice (e.g., Eldevik et al., 2009; Granpeesheh et al., 2009; Prior, Roberts, Rodger, Williams, & Sutherland, 2011). As this research shows, rigorous and consistent implementation of behavioral procedures including Discrete Trial Learning and Incidental Teaching, results in increased measures of social and cognitive skills, in children with ASD and other developmental delays.

Due to its time-frame and intensity EIBI is typically implemented as

a home or clinic-based program. Nonetheless, studies have shown its successful implementation in mainstream pre-schools classrooms despite the increased limitations in intervention time and other resources (Eldevik et al., 2009; Eldevik, Hastings, Jahr, & Hughes, 2012; MacDonald, Parry-Cruwys, Dupere, & Ahearn, 2014; Rivard, Morin, Mello, Terroux, & Mercier, 2019).

Appropriate and early behavioral intervention, changes the educational trajectory of students with autism and makes inclusive education a possibility for many students. One of its major goals is to increase the likelihood that a student with autism will be able to receive instruction in a regular education classroom (Eldevik et al., 2009; Lovaas & Smith, 2003). In spite of its widely documented effectiveness however, it is less clear whether the same positive outcomes are maintained upon

introduction to the inclusive classroom.

Currently, there is a large degree of variability in academic achievement across students with autism (Keen, Webster, & Ridley, 2016). As a group, these students typically experience more academic challenges compared to their typically developing peers (Mayes-Dickerson & Calhoun, 2007). Further, although parents of students with autism report a desire to have their child included in a regular education classroom (Kasari, Freeman, Bauminger, & Alkin, 1999), they also generally report being unsatisfied with their child's academic achievement (Mackintosh, Goin-Kochel, & Myers, 2012), and this dissatisfaction seems to increase with the age of the child (Starr & Foy, 2012). Thus, although there is a strong interest for inclusion of children with autism in general education classrooms as is evidenced by the increasing trend in this practice, the academic outcomes of these children are often deemed unsatisfactory by the parents.

This might be partially explained by the nature of the instructional practices used in inclusion classrooms. Although instructors and parents report having a positive attitude toward the general idea of inclusion (Segall & Campbell, 2012), consistent implementation of the relevant educational strategies, a key element to student's success, is seldom possible. This seems to be largely due to how teachers experience the reality of inclusion in their classrooms. Results from surveys and other studies systematically show that general education teachers feel underprepared to meet the challenges of teaching children with autism. One of the biggest challenges reported by teachers is the lack of training and resources to create an inclusive classroom environment, and to manage the disruptive behavior of children with autism (Anglim, Prendeville, & Kinsella, 2018; Lindsay, Proulx, Thomson, & Scott, 2013; Majoko, 2016; Segall & Campbell, 2012). In sum, while EIBI has been well established as an effective practice leading to increased opportunities for inclusion, the practices that are employed upon reaching the inclusion classroom may not be those that are particularly effective for students with autism (Segall & Campbell, 2012).

Although low academic engagement in children with autism is often attributed to their autism diagnosis, research in Applied Behavior Analysis has consistently shown that interventions targeting environmental adjustments can produce an increase in academic engagement and a concomitant decrease in problem behaviors associated with educational challenges (Crosland & Dunlap, 2012; Rispoli et al., 2011). Because some environmental factors functionally related to increased academic engagement are under the instructor's control, strategies designed to produce positive behavior changes can be implemented by the teacher or the teacher aid directly. We classified these strategies under four major categories defined by the types of environmental variables impacting the student's behavior: (a) Factors affecting student's motivation, (b) Consequences for academic behavior, (c) Learning history with the instructor, and (d) Learning history with the classroom setting and educational activities.

As a guide and resource for educators of inclusive classrooms, in this paper we suggest a set of behavioral strategies that have demonstrated effectiveness in increasing academic engagement and decreasing problem behavior in children with autism, and that are easily applicable in classroom settings. The following sections provide a brief explanation of each strategy, its general procedures and outcomes, and some of the studies documenting their effectiveness. A summary is presented in Table 1.

2. Increasing student's motivation

One of the most common challenges faced by instructors, is arranging instruction in a manner that maintains the attention and interest of the students. Teaching through inquiry and encouraging students to ask questions are typically regarded as instructional practices that promote higher student involvement in classroom activities.

Strategies that are effective at improving motivation in typically developing students are not always as successful with students

diagnosed with autism, however. For example, when students with autism are presented with tasks that fail to sustain their interest they are more likely to refuse to participate in classroom activities, and/or engage in other disruptive behaviors (Koegel, Singh, & Koegel, 2010). Although motivation is important for any student it is particularly important for students with autism who may be at risk for academic failure. Among some of the effective evidence-based instructional strategies that could be used for improving motivation of students with autism in inclusion classrooms are: providing choices throughout the day, interspersing tasks during instruction, and using Active Student Responding techniques.

2.1. Providing choices frequently

Children with autism who engage in problem behavior tend to have less opportunities to access reinforcement and a smaller number of interactions with teachers and peers. In addition, teachers are less likely to provide tasks or instructions to children with autism if those tasks are likely to evoke problem behavior. All of this results in an environment that does not properly foster task engagement and provides limited opportunities for learning (Morgan, 2006).

One effective practice to increase and maintain motivation in students with autism is to provide abundant opportunities to make choices throughout the school day. The use of this practice has been shown to have a positive impact on work completion, interest in activities, student affect, and to decrease the occurrence of inappropriate behaviors (Reutebuch, El Zein, & Roberts, 2015; Sullivan & Roane, 2018; Tullis et al., 2011).

Providing choice opportunities can be both simple and subtle in application while still yielding highly positive results. Koegel et al. (2010), for example, found that giving students a choice of where to sit, whether to use a pencil or chalk to complete a math problem, and the rewards available for work completion, resulted in decreased time to begin working, increased work completion, and decreased occurrences of disruptive behavior. Similarly, Rispoli et al. (2013) demonstrated that across-activity choices and within activity choices, were effective in reducing challenging behaviors in children with autism (see also Ennis, Lane, Oakes, & Flemming, 2019).

Having the opportunity to choose the most preferred activities or materials allows the child to access reinforcement frequently without engaging in problem behavior. In general, children will engage in the activity that provides the higher amount of reinforcement without a high degree of response effort. Thus, providing choices is an effective practice to the extent that preferred activities produce reinforcement that competes with the variables maintaining problem behavior (Morgan, 2006).

As with typically developing students, motivation for students with autism fluctuates throughout the day. Because what was motivating earlier in the day or week may not be so at a later time, it is necessary to provide these opportunities regularly and frequently throughout the school day. This may take the form of offering more than one way to complete an assignment, asking the student which assignment he'd like to complete first, providing a choice of materials, or allowing the student to select a reward to be earned after work completion. This practice can be easily incorporated in classwork activities and has shown to be effective when implemented in inclusion classrooms by classroom teachers (Lane et al., 2015).

The primary difficulty with embedding choice opportunities lies in merely remembering to do so. Therefore, rather than providing a choice opportunity whenever a situation arises, instructors should actively program choice-making situations into their daily routine to ensure opportunities are provided evenly and regularly throughout the day. Teachers who have used this practice report that it helps improve the experience of children with autism in the classroom (Morgan, 2006). When implemented consistently this practice significantly decreases problem behavior and increases children's compliance and engagement

in instructional activities.

2.2. Task interspersal

Another approach that has been shown to effectively increase student motivation is interspersing easy tasks throughout instruction of novel or more challenging material (Benavides & Poulson, 2009). Task interspersal has been shown to increase student's on-task behavior and to decrease problem behavior maintained by escape/avoidance of challenging task demands (Calderhead, Filter, & Albin, 2006).

The goal of task interspersal is to embed mastered material within new skill acquisition tasks. Generally, a task can be considered mastered when the child can perform it accurately in more than 80% of the trials. By alternating between relatively easy and more challenging tasks, the learner will emit a higher rate of successful responses, and thus, access a higher number of opportunities for praise and other reinforcers associated with the student's engagement (Pitts & Dymond, 2012). By contrast, when difficult tasks are continuously presented, the learner will have less opportunities for success and will experience higher levels of frustration.

Easy tasks can be defined as tasks that have a probability of correct responding of 80% or higher. Recent research on the application of this procedure shows that it produces higher results when the interspersed easy tasks are directly relevant to the instructional material. For example, adding easy words to a reading word list is more likely to result in compliance with reading difficult words, than interspersing easy math questions or providing motor imitation instructions. Further, research findings suggest that varying the rate of presentation of easy tasks prior to the more challenging tasks is also more likely to produce increased overall task engagement (Planer, DeBar, Progar, Reeve, & Sarokoff, 2018).

Programming task interspersal into classwork can take on a variety of forms depending on the specific task at hand. If the task is completing math problems for example, a math sheet may include easy math problems mixed in with novel or more difficult ones. Geography questions could include questions on topics that have been successfully learned (easy tasks), and questions that are being currently learned (difficult tasks). The goal should be to construct assignments wherein approximately 1/3 of the tasks are relatively easy, or have been already mastered (Bottini, Vetter, & Gillis, 2019; Calderhead et al., 2006; Rapp & Gunby, 2016).

This strategy can be implemented for all students in conjunction with whole-group instruction techniques such as choral responding or response cards (Nagro, Hooks, Fraser, & Cornelius, 2016), as part of small group-instruction activities, or even in the context of independent work. Its time effectiveness and ease of implementation makes it a valuable resource for teachers in inclusion classrooms.

Although implementing task interspersal may require spending slightly less time on instruction of new material, the benefits outweigh this potential cost, particularly, when the child has a history of avoiding or escaping instruction by engaging in disruptive behavior. When easy and difficult tasks are interspersed, students are generally more likely to choose to engage in their work assignments and are also more accurate in their responses (Hawkins, Skinner, & Oliver, 2005; Skinner, Wallace, & Neddenriep, 2002). Further, reviewing previously mastered material, strengthens the skills acquired and promotes maintenance and generalization of the acquired skills to novel situations and settings.

2.3. Active student responding

Instructors attempting to increase overall academic engagement in an inclusion classroom may consider incorporating Active Student Responding (ASR) techniques. These whole-group instruction strategies involve providing all students with frequent opportunities to respond and frequent contact with class content (Kamps, Dugan, Leonard, & Daoust, 1994; Nagro et al., 2016; Rosenshine, 2012; Tincani, 2011;

Twyman & Heward, 2016). Among the ASR practices with well-established effectiveness in increasing student engagement and academic performance are choral responding and response cards.

In choral responding all students respond in unison to a short-answer question delivered by the instructor. This method allows for all students to receive equal opportunities to respond and is associated with increased on-task behavior, increased rates of correct responding (Haydon, Marsicano, & Scott, 2013; Tincani, 2011) and decreased frequencies of challenging behavior (Haydon et al., 2013).

Response cards are similar to choral responding in that it allows the instructor to engage all students in the classroom. With choral responding however, it may be difficult to track the performance of individual learners (Randolph, 2007). Response cards on the other hand allow for individual monitoring and feedback, while also engaging all the students in the classroom. When using response cards, students hold up a card with the correct answer to a question posed by the instructor. Students can either write the response on a blank card, or select between written cards that are provided to all students. Feedback for correct responses can be delivered to the whole group, and individually (Nagro et al., 2016).

Asking questions frequently or at a high pace, maintains students on-task, increases access to feedback and reinforcement and prevents the occurrence of challenging behavior. However, an alternative that may benefit students who require more time to respond is allowing students to confirm their answer with a peer before requiring a final response of all students as a group (Tyminski, Richardson, & Winarski, 2010).

One of the greatest benefits of using ASR strategies to deliver academic content, is that they help the student with autism feel included in the learning activities. When necessary, the instructor can make data-based decisions to plan additional small-group activities to present the content in alternative ways. Doing so provides frequent opportunities to strengthen the acquired skills, to access positive feedback, and to engage academically and socially.

3. Establishing consequences for academic behavior

Another factor that may influence an instructor's effectiveness in teaching students with autism within an inclusion setting is the extent to which instructors deliver effective and appropriate consequences for successful academic performances. For typically developing students, praise or grades may serve as consequences that adequately maintain appropriate academic behaviors. Students with autism however, may be less responsive to socially mediated consequences due to the social impairments associated with this diagnosis (Ferraioli & Harris, 2010). Further, consequences such as grades and other forms of feedback for academic work may be delayed, or not immediately contingent upon students' performance, which makes them less effective on maintaining satisfactory academic behavior for children with autism (Koegel, Matos-Freeden, Lang, & Koegel, 2012).

Including additional incentives that can be delivered immediately and contingently upon the occurrence of appropriate academic behavior will facilitate the success of students with autism in inclusive settings. Finding effective incentives or reinforcers however, requires conducting preference and reinforcer assessments regularly. These assessments will help instructors identify preferred items or activities that will serve as potent and effective consequences to strengthen academic behavior. Self-management strategies also provide ways to involve the child in their own learning process. By using these strategies, children can learn to observe and acknowledge the relation between their own behavior and its consequences. Independent functioning is also fostered when children learn to self-monitor their own performances and to access their own reinforcers throughout the day.

3.1. Preference assessments

In inclusive settings, instructors typically deliver feedback to encourage appropriate academic responses. Although praise is effective for most students, this is not always the case for students with autism who may not be as sensitive to conventional forms of social praise. One of the core features of autism is to have a restricted array of interests and preferences. Over time, these restricted interests may lead to the development of idiosyncratic reinforcers which may be highly effective, once they are identified.

Preference assessments are an evidence-based practice that is frequently used for identifying potential reinforcers to use in the treatment of problem behavior or to increase academic skills. There are a variety of preference assessment methods available depending on the student's communication skills (DeLeon & Iwata, 1996; Fisher et al., 1992; Roane, Vollmer, Ringdahl, & Marcus, 1998).

For students with minimal language abilities, the Paired-Choice Preference Assessment (Fisher et al., 1992) or the Multiple Stimulus Without Replacement Preference Assessment (see Carr, Nicolson, & Higbee, 2000), are some of the most commonly used options to identify preferred items that may function as reinforcers. Depending on the student's ability to scan an array of objects, the student is asked to choose between two (Paired-Choice Preference Assessment), or more preferred items or activities (Multiple Stimulus Preference Assessment). In both assessments, the student is presented with a series of trials and is asked to pick only one of the items presented. A hierarchy of preference is established based on the proportion of times the item was selected given the number of times each item was presented. The item with the higher ranking is likely to function as an effective reinforcer. Reinforcer effectiveness is demonstrated if a behavior increases as a result of having been followed by the presentation of this item or activity.

For students with high language abilities, the instructor may simply ask the student to rank a list of items/activities in order of preference or to list a variety of items/activities that they find rewarding. In either case, the goal is to allow individual student behavior to dictate the rewards to be used rather than to use incentives that are effective for other students in the classroom or that are commonly assumed to reinforce behavior (e.g., candy, stickers, verbal praise).

On the other hand, although children with autism are not often susceptible to social reinforcers due to their difficulty to attend to social stimuli (Dube, MacDonald, Mansfield, Holcomb, & Ahearn, 2004), idiosyncratic forms of attention and praise may be used effectively with some children, depending on their social abilities. In social reinforcer assessments, pictures or videos showing idiosyncratic forms of attention or praise can replace items or activities presented in the stimulus array to effectively identify preference. Some examples of social stimuli that have been used as potential reinforcers for children with autism are high-fives, head rubs, singing, short conversations and tickles. Informal interviews with caregivers and frequent interactions with the student should always inform the types of stimuli to be included in preference assessments (Kelly, Roscoe, Hanley, & Schlichenmeyer, 2014; Smaby, MacDonald, Ahearn, & Dube, 2007).

After conducting a preference and reinforcer assessment, an instructor can arrange for the delivery of the preferred item/activity contingent on appropriate classroom behavior. Delivering consequences that have been selected in such a systematic and individualized manner is more likely to produce behavior change than simply selecting consequences that have worked for other students in the past or that were selected through familiarity with the student (Cote, Thompson, Hanley, & McKeerchar, 2007).

Given their relative ease of implementation and their practical utility, more and more teachers and caregivers are being successfully trained to conduct stimulus preference assessments using different training technologies such as pyramidal training (Pence, St Peter, & Tetreault, 2012), and video modeling (Deliperi, Vladescu, Reeve,

Reeve, & DeBar, 2015; Weldy, Rapp, & Capocasa, 2014). In addition, research on time effective preference assessment techniques shows that the multiple Stimulus Without Replacement preference assessment can be conducted in a short time (approx. 5 min) and with the same accuracy as the longer versions (Carr et al., 2000). For students with ample verbal repertoires, checklists or interviews with parents are recommended. Conducting these assessments is not only a useful and necessary practice for finding effective reinforcers. It is also practical and beneficial for establishing student-teacher rapport.

3.2. Self-management strategies

Self-management requires that the student takes an active role in addressing his or her classroom behaviors by either monitoring and recording their occurrence, self-delivering the consequences programmed for those behaviors, or both. Self-management techniques have been shown to decrease problem behavior and increase academic engagement for students with autism across different grade levels (Carr, Moore, & Anderson, 2014; Cihak, Wright, & Ayres, 2010; Clemons, Mason, Garrison-Kane, & Wills, 2016; Holifield, Goodman, Hazelkorn, & Heflin, 2010; Roberts et al., 2019; Southall & Gast, 2011).

To teach a student to manage their own behavior, an instructor must first identify and define a target response in need of improvement. The target response may be a specific academic skill, an appropriate classroom behavior such as attending or being on-task, or a disruptive behavior. After initial instruction on how to accurately measure and record the occurrence of the target behavior, periodic checks are performed to ensure the accuracy of the self-reports, and feedback is continuously provided. Further, studies have found that in addition to reinforcement for accurate self-recording, including visual or verbal prompts, can also contribute to produce increased academic engagement and productivity in students with autism in inclusion classrooms (Carr et al., 2014; Cihak et al., 2010; Clemons et al., 2016).

In most cases, self-management strategies involve providing access to reinforcers after meeting a predetermined behavioral goal. To illustrate, after modeling and practicing on-task behavior, the student could be provided with a data sheet and a timer or device to cue self-recording. At predetermined intervals, the device cues the student to record whether he/she was engaging in on-task behavior at that moment. Access to reinforcers is provided if at the end of the class period the student accumulates a certain number of checks, i.e., remained on-task for a certain number of intervals. As student behavior improves, the interval between the signals may be lengthened to further promote independent functioning and to fade the self-management program over time.

For instructors working with students with autism in inclusion settings, one of the main advantages of using self-management strategies is its time-efficiency. Instructors in inclusion classrooms may have less time to record behavioral data and deliver consequences for appropriate or inappropriate behavior. An effective alternative to further facilitate the implementation of self-management strategies is the use of handheld electronic devices (Clemons et al., 2016). These self-management strategies promote independent functioning and provide the student with an individualized reinforcement system that can be adjusted for use in different instructional settings and for a variety of behavior change goals.

4. Establishing a positive learning history with the instructor

Student engagement with the academic materials is of critical importance in any classroom. Students with autism often exhibit reduced levels of engagement relative to their typically developing peers (Sparapani, Morgan, Reinhardt, Schatschneider, & Wetherby, 2016), and this engagement decreases as autism severity increases (Dykstra Steinbrenner & Watson, 2015). Although there may be a variety of factors that influence student engagement, one important factor is the

students' learning history with the instructor.

A positive learning history associated with the instructor may be affected if the student's behavior has not come under instructional control, that is, if compliance with instructions has not been sufficiently paired with positive reinforcement. For example, if academic material is frequently above the student's performance level, the student may experience repeated failure, have less opportunities to access reinforcers, and thus be less inclined to attend to instructions or to be engaged in classroom activities in the future.

Two evidence-based strategies may be used by instructors to improve their relationship with the student with autism, namely, pairing the instructor with positive reinforcers and using prompting strategies during instruction. Pairing the instructor with positive reinforcers is a simple and effective way to counteract a history of non-compliance and increase the likelihood of attending. Through pairing, an instructor can build a positive relation with the student, which has been demonstrated to be a predictor of positive student outcomes (Manti, Scholte, & Van Berckelaer-Onnes, 2013). Incorporating prompting and fading strategies into instruction facilitates and maximizes the likelihood of student's success, prevents the exposure of students to successive failed attempts at learning a skill, and further strengthens the association between the presence of the instructor and the achievement of positive outcomes.

4.1. Pairing

While providing instruction to students with autism, presenting challenging materials and making demands on students are often routine activities in a classroom. However, when a student is repeatedly unsuccessful, the task demands will acquire aversive properties, and the instructor providing these demands is likely to become aversive as well. Students with autism may cry, engage in disruptive behavior, or otherwise attempt to escape the instructor's presence if the instructor has become a cue for unpleasant demands. Pairing can be a beneficial strategy to use when the instructor has become an aversive cue, and/or to increase the child's positive responses in the presence of the instructor. This strategy is highly time effective, and does require resources other than classroom materials and available preferred items or activities.

In its most basic form, pairing merely requires: identifying an activity or item that the student prefers, approaching the student when they are not engaged in the activity or with the item, and presenting the item and engaging in the activity with the student. The interaction should be enthusiastic, positive, and without demands. Through pairing, rather than being associated with aversive demands, the instructor becomes associated with reinforcement (Sundberg & Partington, 1998). Two-minute pairing sessions conducted prior to academic instruction (pre-session pairing), have been shown to decrease the frequency of problem behaviors during instruction, and to improve the student's academic performance (Kelly, Axe, Allen, & Maguire, 2015).

Brief, 2-min pairing sessions can be scheduled throughout the day or week to ensure a positive association with the instructor. Specific activities that have been included as part of the definition and practice of pre-session pairing include: staying within arm's distance of the student, using behavior-specific praise contingent on appropriate behavior, repeating vocalizations made by the child, imitating and describing play skills exhibited by the child, offering toys or activities to the child, and using objects in new ways to create novel play activities (Lugo, King, Lamphere, & McArdle, 2017).

Recent research by Lugo et al. (2018) compared preference between pre-session pairing immediately prior to instruction, a free play session immediately prior to instruction, and the immediate onset of instruction. Their results show that a child with autism preferred pre-session pairing over the other two conditions. These results suggest that it is the quality of the positive interaction with the instructor that produces

improvement in academic performance and reduced rates of challenging behaviors during instructions, and not, the availability of preferred items or toys, or the delay to the onset of instruction.

4.2. Prompting and fading

To increase the likelihood that a student will successfully respond to academic instruction, it is important that the instructor incorporates appropriate prompting and fading strategies, also known as errorless learning procedures (Mueller, Palkovic, & Maynard, 2007). As opposed to trial-and-error learning in which a student is allowed to make multiple errors, and mistakes are presumed to spur learning, errorless learning attempts to prevent incorrect responses by incorporating prompts from the beginning of instruction. As the learner becomes more successful, these prompts are gradually and systematically removed (Mueller et al., 2007).

The goal of this strategy is to reduce the number of errors as much as possible and to maximize opportunities for reinforcement associated with prompting and correct responding. Generally defined, a prompt is a cue or a hint that is used to evoke a desired response. When a prompt is associated with multiple corrections, the prompt and the overall instruction situation are likely to become aversive, as the student experiences recurrent frustration and failure. By contrast, in errorless learning the instructor provides a strong cue that evokes the correct response. Once the correct response is emitted successfully several times, fading procedures are used to transfer stimulus control from the prompt to the relevant stimulus (worksheet, question, picture, etc).

One method of errorless learning that has a growing base of empirical support is simultaneous prompting (Heinrich, Collins, Knight, & Spriggs, 2016; Leaf, Sheldon, & Sherman, 2010; Waugh, Alberto, & Fredrick, 2011). By contrast with typical instruction which allows the student "thinking time" and may result in repeated errors, in simultaneous prompting the instructor immediately provides the correct answer. The cue and prompt are delivered simultaneously. The instructional sequence might look as follows: Instructor (delivers cue) – "What is the third planet from the sun?" > Instructor (immediately prompts) – "Earth" > Student says – "Earth", > Instructor (provides feedback) – "You got it. Very good".

Often, the instructor asks the question one additional time without providing the prompt to allow the student to respond independently. Finally, to assess whether the student is adequately learning the material, probe sessions may be conducted throughout the day. During these sessions, the cue is provided in the absence of prompts. The expected outcome is an increased rate of successful responding during probe sessions, after exposure to sets of trials in which the student responded 100% accurately with assistance.

One significant strength of simultaneous prompting is that the instructor does not need to systematically wait longer periods of time before prompting (as in Time-Delay), or to gradually alter the intrusiveness of the prompt (as in Most-to-Least or Least-to-Most prompting) (see (Severtson & Carr, 2012). In simultaneous prompting, both the prompt and the prompt delivery remain unchanged throughout the procedure (Heinrich et al., 2016; Kurt & Tekin-Iftar, 2008; Mueller et al., 2007; Tekin-Iftar, Collins, Spooner, & Olcay-Gul, 2017).

Although this strategy is typically used in the context of Discrete Trial Training sessions, it can be embedded into small group activities or ASR techniques in inclusive educational settings (see Heinrich et al., 2016). However, correct implementation of this strategy may require training, and the assistance of a teacher aide or a peer tutor in an inclusion classroom (Heinrich et al., 2016). In a recent study by Tekin-Iftar et al. (2017), the authors trained general education teachers to use a simultaneous prompting procedure with students with autism. Teachers demonstrated accurate acquisition of the skills and were able to implement the procedure to teach a variety of academic content. Overall, teachers and students gave positive reports about the training and the procedure and were satisfied with the outcomes. Self-

instruction manuals have also been developed to effectively train instructors to implement MTL prompting procedures in the context of Discrete Trial Instruction (Severtson & Carr, 2012).

5. Learning history with the setting or activity

Although classroom structure is important for all students, it is particularly important for students with autism, as consistent structure has been shown to positively affect improvement in academic skills (Manti et al., 2013). Students with autism that do not comprehend the structure embedded within a classroom are more likely to engage in disruptive behaviors. Further, because disruptive behaviors may frequently result in a delay or termination of an unpredicted event that may be aversive, the frequency of these behaviors is likely to increase. Two evidence-based practices that are often recommended to decrease problem behavior associated with the inability to predict upcoming events, are the use of visual schedules, and priming strategies. While schedules allow students to predict daily routines and upcoming events and activities, priming teaches the student how to respond appropriately during these activities.

5.1. Schedules and structure

Activity schedules have been used as an antecedent procedure to decrease disruptive behavior and increase social interaction in students with autism (Lequia, Machalicek, & Rispoli, 2012). Visual activity schedules are a common evidence-based strategy used to teach appropriate on-task behavior, improve latency to task completion or task initiation, decrease problem behavior during transitions, and decrease the number of prompts needed to start new tasks or to change activities (Knight, Sartini, & Spriggs, 2015; Pierce, Spriggs, Gast, & Luscre, 2013).

Visual activity schedules depict a sequence of events through pictorial display. Typically, they consist of a series of pictures affixed to a board via Velcro, but Power Point slides or videos have also been used effectively (Van Laarhoven, Kraus, Karpman, Nizzi, & Valentino, 2010; Waters, Lerman, & Hovanetz, 2009). Activity schedules direct the attention of the student with autism towards current and upcoming tasks. They can also be used to increase independence in students who need frequent prompts to engage in the next step of a task. A task analysis of the steps involved in a task can be presented in the form of a visual schedule to reduce teacher's assistance and increase student's independence (Meadan, Ostrosky, Triplett, Michna, & Fettig, 2011). Completed tasks or activities are marked, removed, or checked off and upcoming activities are signaled, touched or pointed at by students and instructors. Increased independence, on-task behavior, and compliance with transitions and classroom routines, have been demonstrated after effective implementation of this strategy by teachers in mainstream classrooms (Macdonald, Trembath, Ashburner, Costley, & Keen, 2018; Watson & DiCarlo, 2016).

Visual activity schedules are flexible and can be adapted to the class routine and to the functioning level of the student with autism. For example, they can be created to depict activities that will happen over a short period of time (several minutes), over a long period of time (days or weeks), or to show a visual support of the steps required to complete an activity. Using visual schedules improves classroom behavior by using the student's strengths in receptive communication skills.

5.2. Priming

Although visual activity schedules are an important instructional component to make a student with autism aware of upcoming events, there are times when a student may need advanced preparation, which is referred to as priming. In this strategy, the student is provided a preview of an upcoming activity in a rewarding, low demand setting (Wilde, Koegel, & Koegel, 1992). This technique is effective for reducing problem behavior, increasing classroom performance (Wilde et al.,

1992), increasing social engagement and initiation (Gengoux, 2014), and facilitating social interactions in inclusive classrooms (Kamps et al., 1992; Kim & Boradhead, 2015; Sawyer, Luiselli, Ricciardi, & Gower, 2005).

Priming is a general term that can be used to describe a variety of different methods of preparing a student with autism for an upcoming schedule change. Although typically, this preparation is provided verbally, it may also be provided via video-taped instruction (Cuvo, Reagan, Ackerlund, Huckfeldt, & Kelly, 2010).

The type of priming used, largely depends on the size of the upcoming change, or on the likelihood of the activity to evoke problem behavior. For minor schedule changes, it may be enough to simply direct the student's attention to the change. The instructor may take the student to the visual activity schedule, direct his/her attention to the new activity, and explain the change in the schedule. This should occur in advance of the activity change, however. If for example, there is an assembly at the end of the day, the instructor would use priming early in the day, and perhaps several times per day. During priming the instructor will describe and explain the expected behaviors during the assembly.

For larger schedule changes or for activities that are likely to evoke problem behavior, the instructor may model and rehearse with the student the expected behaviors several times prior to the activity (Gengoux, 2014; Sawyer et al., 2005). For example, if a student is expected to provide a short oral report to the class on a topic, the instructor may have the student practice in a low-demand setting while providing high levels of reinforcement. Because this strategy requires practicing, role-play and rehearsing individually with the student, it requires extra-time or the assistance of a paraprofessional.

6. Discussion: implications for promoting inclusion programs

As students with autism continue to receive high-quality EIBI, an increasing number have started to be included in regular education classrooms. Placing children with autism in inclusion classrooms has significant benefits not only for the student with autism but also for typically developing students. Some of these benefits include improved understanding of individual differences, increased cooperation skills, and increased respect for all members of a community.

Although inclusion is generally accepted by parents and educators the academic performance of children with autism in inclusion classrooms often falls below expectations. With the increasing number of autism diagnoses and the requirement of placing children in the least restrictive environment, schools today are having to face a major responsibility. While educators have the responsibility to teach all children, most of them may not have specialized training to teach children with autism.

Although there may be numerous factors affecting academic engagement in students with autism, academic difficulties frequently stem from four main areas: (a) student's motivation, (b) consequences for academic behavior, (c) the student's learning history in with the instructor, and (d) the student's history in the classroom environment. Research has demonstrated that students with autism can make academic progress alongside their regular education peers when adequate behavioral supports in each of these four areas are provided (Koegel et al., 2012).

The behavioral techniques described here should be viewed as suggested resources to increase the success of teachers and students with autism in inclusion programs. By allowing the child to experience high rates of success during instruction, these evidence-based strategies facilitate academic engagement and decrease the likelihood of disruptive behaviors in the classroom.

The strategies suggested here meet two criteria: (a) their effectiveness has been empirically demonstrated, and (b) they can be effectively implemented by teachers and school personnel. Furthermore, most of them can be easily adapted to daily classroom routines. Providing

choices, task interspersal, ASR, self-management, assessing preferences, and schedules, can be used within the context of whole-group instruction or with minimal adjustments to regular daily activities. By incorporating these strategies into their daily practice, instructors will be able to meet the needs of the child with autism in the regular education classroom, thus making individualized instruction outside of the classroom, minimal or unnecessary.

Children who have more positive academic experiences and display less disruptive behavior are also likely to have a higher number of opportunities for engaging in positive social interactions. By making slight modifications to their teaching practices, schools and regular education instructors will be contributing to the success of the student with autism in a wide variety of learning environments.

Successful inclusion programs are likely to generate a level of community awareness that will help inspire additional initiatives in other school systems. Acknowledging that the supports required for the success of these programs do not involve allocation of extra time, professionals, and other resources, may be a key component in the dissemination and promotion of these programs.

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