Response to Intervention for Students with Autism Spectrum Disorder

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Abstract: - This study explores the problem of teaching students with ASD using technology by providing most effective interventions that can be used in Tier 3 of RtI for students with ASD. The main goal is to help and prevent those students with ASD who have abilities to learn from being referred to Special Education service in early time. The study reviewed related literature and previous studies to achieve the objectives of the study. The review showed that there are many effective interventions for students with autism spectrum disorder (ASD) that can be introduced and utilized at early time of their school life, so that could help them to stay at regular schools and learn with typical students. The findings also showed the important of using computer-based interventions to teach and solve the problems of students with ASD. Future research should focus on developing more interactive and responsive interventions.

Keywords: - students with ASD, special education, technology, computer-based interventions.

Introduction

In the past few years, autism spectrum disorder (ASD) has received increased attention from physicians, researchers, parents, and educational specialists around the world. One reason for this increase is due to the growing number of individuals who have been diagnosed with ASD. For instance, the Center for Disease Control and Prevention (2011) has estimated that "an average of 1 in 88 children in the United States has an ASD". On the other hand, Response to Intervention (RtI) model is new and not commonly used for students with ASD. In this paper, I will address that problem by providing most effective interventions that can be used in Tier 3 of RtI for students with ASD. My main goal is to help and prevent those students with ASD who have abilities to learn from being referred to Special Education service in early time.

Literature Review

In this section, I will discuss the research on Autism Spectrum Disorder (ASD). Specifically I clarify the prevalence, address the definitions and diagnostic features of autism and ASD, including a description of the characteristics of both. In addition, I also examine the instructional needs of students with ASD. I end this review with an examination of the effective interventions that could be used in Tier 3 of Response to Intervention model for students with ASD. This discussion includes the exploration of research on computer-based and software-based instruction of students with ASD. Also, I discuss the importance of parental involvement, attitudes, and perceptions.

Prevalence of Autism Spectrum Disorder (ASD)

The prevalence of children who have autism spectrum disorder (ASD) has markedly grown during the last ten years by approximately 173% (Sansosti & Powell-Smith, 2008), for many reasons. First, the awareness of ASD has increased among parents, teachers, and others. Second, the diagnosis of ASD has become more accurate and children are being diagnosed earlier. Third, the borders of the autism spectrum are now clear and identified (Downs & Downs, 2010; Sansosti & Powell-Smith, 2008; Zager, 2005). In fact, ASD is considered as "the fastest growing developmental disability category in the United States" (Zager, 2005, p. 162). In 2007, it was estimated that 1 in 150 children had ASD and this year, 2012, it was just published by Centers for

Disease Control and Prevention (CDC) that 1 in 88 has ASD (Downs & Downs, 2010). This increasing number of children who have ASD and the wide variety of needs they manifest requires providing excellent education that meets their different needs.

Autism and Autism Spectrum Disorder (ASD)

Autism is a developmental disorder that occurs very early in a child's life, and impacts the development of essential behaviors and skills, such as communication, imagination, social interaction, and developing relationships with others (National Research Council, 2001). "Autism is best characterized as a spectrum of disorders that vary in severity of symptoms, age of onset, and associations with other disorders (e.g., mental retardation, specific language delay, epilepsy)"(National Research Council, 2001, p. 11). Moreover, the manifestation of various characteristics can change over time within a student with autism or even among many students with autism. Even though social deficits are common among students with autism, students with autism do not necessary share in common a specific typical behavior (National Research Council, 2001).

Contributions by Leo Kanner, Hans Asperger, and Micheal Rutter have shaped the current clinical conception of autism. Kanner Syndrome or the classic autism is "the prototypical ASD, representing the PDD [Pervasive Developmental Disorder] subtype that involves the most severe social-communicative impairments and the greatest number and range of clinical characteristics" (Zager, 2005, p. 6). Kanner Syndrome's essential features "are most closely captured" by the Diagnostic and Statistical Manual (DSM-IV) and International Classification of Disease (ICD-10) (Zager, 2005, p. 6). In 1943, Leo Kanner described a unique neurodevelopmental problem that happens when changes in routines, environment, and close people occur to persons with autism. Leo Kanner termed this description as early infantile autism. Also, he included in his description many secondary characteristics of early infantile autism such as repetitive behaviors, language and speech abnormalities, unusual sensitivities, and abnormal cognitive development.

In 1944, Hans Asperger, a German Viennese physician, described four children who presented significant social skill impairments. These children also had some linguistic skills and strong problem-solving skills. Asperger's study was not known to many professionals until the 1980s because it was originally published and written in German language only.

Autism was considered a psychotic condition and many were giving the diagnosis childhood schizophrenia until the Diagnostic and Statistical Manual-third edition (DSM-III) was published in 1980 by the American Psychiatric Association (APA). In fact, DSM-III used diagnostic criteria that reflected the original criteria by Kanner (Zager, 2005). Later on, the term pervasive developmental disorders (PDD) was introduced as an umbrella term for autism and other disorders that have similar social impairments as autism while varying in repetitive behaviors and manifestation of communication delay (National Research Council, 2001). This diagnostic term includes Asperger, autistic disorder, and pervasive developmental disorder-not otherwise specified (PDD-NOS) according to the fourth edition of DSM (DSM-IV). "Collectively, these disorders are referred to as autism spectrum disorder (ASD)" (Bertrand et al., 2001, p. 1155; Zager, 2005, p. 7). For the purpose of this paper I will use the term ASD. There are three major categories of ASD:

A. qualitative impairment in social interaction;
B. Impairments in communication;
C. Restricted, repetitive, stereotyped behavior, interests, and activities" (Zager, 2005, p. 7).

Diagnostic features. The process for diagnosing autism spectrum disorder (ASD) is difficult due to the complexity and variability of how their characteristics and symptoms present. For instance, the degree of associated cognitive impairment varies among students who have autism. Another reason that makes diagnosing ASD more complex is the wide range of associated developmental disabilities such as cognitive, mental retardation, learning disabilities, and other behavioral deficits. However, autism can be identified or distinguished from other disabilities by looking to "the presence of a distinctive impairment in the nature and quality of

social and communicative development" (Zager, 2005, p. 1). The most common feature that can help in diagnosing ASD is the deficit in producing spoken language (Bosseler & Massaro, 2003).

Classification of children with ASD. Children with autism spectrum disorder (ASD) can be classified as high-functioning autism or Asperger Syndrome (HFA/AS), or lower-functioning children with autism. Children with high-functioning autism have difficulties with social skills, such as listening and responding to teachers or others, requesting information from others, interacting with others when playing with them, making eye contact, and starting and maintaining conversations (Sansosti & Powell-Smith, 2008). On the other hand, children with Asperger Syndrome (AS) have intelligence quotients (IQ) and expressive language similar to that of typically developing children (Myles, 2005).

Characteristics and Instructional Needs of Students with ASD

Education for students with autism spectrum disorder (ASD) should include academic learning and also provide students with social, language, adaptive, and communication skills and techniques to reduce distracting behaviors. Students with ASD often are not able to accomplish scheduled tasks independently (even though many of these students have strong cognitive skills) because they have difficulties with memorizing, planning, organizing, and others (Gentry, Wallace, Kvarfordt, & Lynch, 2010).

Communication skills needs. According to the National Research Council (NRC) (2001), there are two major communication deficits in students with autism spectrum disorder (ASD): the lack of joint attention skills and inability to use symbols. Joint attention is the ability to coordinate attention between objects and people. The NRC also points out that students with autism usually fail to point to others, get another student's attention, or share emotional moments with others. Also, according to NRC, 2011, the second communication deficit is that students with ASD have difficulties with symbol use of conventional meaning of word or gestures. Education that includes supporting social, language,

adaptive, and communication skills can help students with ASD complete educational tasks independently and improve personal responsibility. In addition, educational goals of students with ASD should be established based on students' deficits such as nonverbal communication, language development, and cognitive disability (National Research Council, 2001).

Social skills needs. Students with autism spectrum disorder (ASD) may also have many social deficits. Zager (2005) states that the central deficit characteristic of students with ASD is an inability to develop and maintain relationships with others. In fact, students with ASD encounter difficulties when they need to respond to others or to interpret their own needs effectively in their social world. Moreover, students with ASD instead of learning from their own social life experiences as typically developing students do need direct social skills instruction.

Behavioral skills needs. Students with ASD also have many behavioral deficits. Zager (2005) indicates that inappropriate and atypical behaviors, reactions, and perceptions are common among students with ASD. Also, students with ASD are hypersensitive to different stimuli such as lights, sounds, tactile, and olfactory. For instance, when students with ASD are exposed to even low intensity sounds or light, this can result in them experiencing agitation, discomfort, and distress. Students with ASD are usually not flexible with changes in daily routines or transitions. This can result in students experiencing social difficulties when dealing with real world. In addition, students with ASD produce repetitive stereotyped behaviors, such as head shaking, hand flapping, and jumping. However, it is important to note that there is no common behavioral symptom across all students with autism, as they represent a range of characteristics along a mild to severe continuum.

Academic skills needs. Students with autism spectrum disorder (ASD) vary in their academic abilities. There are students with ASD who have severe cognitive impairment. They learn academic skills by using many of traditional categories, such as functional academic, self-help skills, language

development, and others. On the other hand, there are students with ASD who are HFA/AS and they need to have modifications in the curriculum and instruction process that meets their specific needs (Zager, 2005).

Effective Interventions in Tier 3 for Students with ASD

Students with ASD require intervention programs that meet their needs, address their weaknesses, and emphasize their strengths. In addition, interventions designed for students with ASD have to be designed based on special challenges that students with ASD present (National Research Council, 2001). The National Research Council (2001) recommended that interventions for a child with ASD should start as early as possible, sometimes even prior to a formal diagnosis, even if there is a suspicion of ASD. (Downs & Downs, 2010). The primary education and treatment for students with ASD should be implemented at school, home, and in community settings (National Research Council, 2001). The National Autism Center report (2009), which reviewed 775 studies of interventions or treatments for students with ASD below 22 years of age, determined that there are four types of interventions for students with ASD. The first type includes established treatments or interventions, which show beneficial effects and are based on well-controlled research. Examples of established interventions are social stories and video-modeling. The second type of ASD interventions are emerging interventions, which are based on studies that have produced favorable results and outcomes when used with students with ASD. The Picture Exchange Communication System (PECS) is an example of an emerging treatment (National Autism Center, 2009). The other two treatments or interventions are respectively named unestablished and ineffective treatments. Since research has not provided positive results or outcomes for using these two treatment types, they will not be discussed here and the focus will be on examples of established and emerging treatments or interventions.

Social stories intervention. The use of social stories as a classroom-based intervention has been effective with students with ASD. It was developed by Carol Gray in 1993, to provide relevant social skills instruction. Social stories address social situations that are difficult to understand. Social stories interventions provide illustrations for specific social situation. This type of intervention is used to improve students' with ASD social skills and adaptive behaviors. Social Stories help students with ASD to interpret difficult social situations. The intervention includes six sentence types: perspective, descriptive, directive, affirmative, cooperative, and control (Okada, Ohtake, & Yanagihara, 2008; Schreiber, 2011). Teachers, therapists, psychologists, or parents can write Social Stories sentences for their children (Zager, 2005).

Video-modeling intervention. Video-modeling intervention has produced effective outcomes with students with ASD. It takes advantage of students' with ASD visual strengths. In the video-modeling intervention the student performs a task after watching a recorded video of the skills for that specific task. This intervention allows the student to repeat a task or skill many times. In addition, it displays a task to the student with ASD with clear details. Tasks or skills that have multiple components, such as toileting, transition, food preparation, and purchasing, can be explained much more easily to a student with ASD by using the video-modeling treatment (Mechling, Gast, & Seid, 2009). Video-modeling has also shown positive effects to be used as school and community settings intervention for students with ASD (Sansosti & Powell-Smith, 2008).

Picture exchange communication system intervention. In 1985, Andrew Bondy and Lori Frost developed the Picture Exchange Communication System (PECS). It was developed to help students with social communication disorders and students with ASD to improve their communication skills. PECS differs from other communication interventions in three major elements:

A. it does not require prerequisite skills; (b) it was designed to address the lack of motivation for social reinforcement; and (c) it immediately teaches initiating, instead of teaching responding before initiating (Bondy & Frost, 1994)" (Tien, 2008, p .62).

Interventions that use visual symbols such as pictures, have got much attention in the last several years as an effective way to work with students with ASD (National Research Council, 2001).

Computer-based intervention. Mechling, (2007) states that the variety and multiple uses of assistive technology (AT) hold promising ways to meet diverse individuals' needs. Computer-based intervention has been an increasing focus of researchers and is one example of an AT. One example of assistive technology (AT) is any electronic device that can be used to assist a person by providing pictures, text, video, sound, or other technology. Using computers in the instructional process with students with ASD is considered a new area in research in the last few years. Computers act as a motivational factor with students with ASD (Sansosti & Powell-Smith, 2008). Computer-based interventions that use handheld devices, laptops, and computers can work for many students with autism as conditioned reinforcers because the students are very motivated by computers (Goldsmith & LeBlanc, 2004).

Bosseler and Massaro (2003) indicated that computer-based instruction is considered as an emerging popular method to expand the vocabulary of students with special needs. Also, computers have been used in schools as a new approach to teach students with ASD language and vocabulary skills. In fact, computer-controlled applications have the advantage of providing texts with supportive sources such as images and sounds at the same time (Bosseler & Massaro, 2003). Integrating these sources with a written definition improves students' ability to learn and memorize target vocabulary. The integration of sound and visual supports is an efficient method for facilitating learning and improving language and vocabularies (Bosseler & Massaro, 2003). "The use of computer-based system compared to paper-based systems such as picture cards, photograph albums, and lists, may hold some distinct advantage" (Mechling, 2007, p. 265). In addition, when comparing computer-based interventions to traditional methods, computer-based interventions show positive effects such as reduction of inappropriate behaviors and an increase in learning,

attention, and motivation (Goldsmith & LeBlanc, 2004).

Bosseler and Massaro (2003) found that students with ASD face difficulties in generalizing and applying acquired skills to real world settings. In addition, students with ASD have difficulties when they deal with new settings that include people who did not participate in the initial training. However, intensive training can help students with ASD to overcome those difficulties and be able to generalize acquired skills. Effective intensive training may contain the use of computer-based tools such as portable devices and tablets with other effective interventions such as social stories, video modeling, pictures, and PECS. Hagiwara and Myles (1999) stated that use of a multimedia approach, such as computer-based instruction, visual symbols, and social stories, with students with autism presented possible positive effects.

Integrating effective interventions into computer programs in Tier 3. Social stories have been integrated into computer-based and multimedia formats. For example, Microsoft PowerPoint is being used to teach students with special needs by integrating activity schedules. In fact, research on this kind of integration provided favorable results even though results varied among students with ASD (Goldsmith & LeBlanc, 2004). Sansosti and Powell-Smith (2008) studied the effectiveness of integrating and combining social stories and video modeling intervention via computers. They found that there might be a beneficial method for meeting social skills deficits among students with ASD. The integration of video modeling in portable devices such as iPod, Apple mp3, and video players has also been studied (Cihak, Fahrenkrog, Ayres, & Smith, 2010). In fact, students' independent transitions increased when they used handheld devices (Mechling, 2011). Moreover, three studies have compared results of integrating pictures into a portable device. The Palmtop personal computer, a portable device that has multimedia input and output with a touch screen has been studied and found to be more effective than manually using pictures on cards (Mechling, 2007).

Mechling et al. (2009) pointed out that the "use of electronic self-prompting devices by persons with

ASD holds promise as a means for increasing students' independence while decreasing their reliance on prompt delivery by teachers, other adults, or peers" (p. 1420). That is, students with ASD may be able to know when to do a task without relying on others by using those types of electronic self-prompting devices. In fact, a portable computer-based system has many advantages compared to a cassette player. For instance, it (a) provides the chance of repeating steps, (b) offers visual supports to auditory instructions of a task, and (c) has a controlling option over visual and auditory prompts (Mechling, 2007).

Parents' Role in Interventions for Students with ASD

Parents are the cornerstone of intervention and education for students with ASD. According to Zager (2005), "a commonly held belief among professionals was that the needs of the child with ASD were so great that parents could not be expected to manage the child without extensive professional intervention" (p. 113). This was one of many misconceptions and assumptions about families and parents of students with ASD. Another misconception is that parents are the cause of their child's ASD (there is no evidence of this) (Zager, 2005). Actually, parents and families are an essential part of providing services and education to students with disabilities. The Individual with Disabilities Education Act (IDEA) supports the importance of parents of students with disabilities in the education process. In addition, families must be active participants in their students' Individual Education Plans (IEP).

Currently, families and parents are considered as the best persons who know and can judge their students with disabilities (Zager, 2005). Also, "the best long-term advocate" for students with ASD is family (Zager, 2005, p. 115). A student's development can be supported and improved effectively if parents have teaching skills and used them with their children at home during daily living activities. Zager (2005) declares that involving parents in their children's education process is important because students spend the majority time of a given day at home with their parents. Thus, learning opportunities

will increase if parents are involved in their child's program and intervention can then be implemented in real world settings. Parents of students with ASD have participated in many interventions for their children with ASD. For instance, parents are involved in writing Social Stories for their children with ASD, in addition to the stories written by teachers, therapists, and others professionals (Zager, 2005). According to the National Research Council (NRC) (2001), the main form of current interventions for children with ASD are based on education of parents, students, and teachers.

Parents' involvement, participation, collaboration, and interaction. Ozonoff and Cathcart (1998) declared that there were three common features of effective treatments: (a) "the use of structured behavioral and educational approaches, (b) training parents to implement the program at home, and (c) enrollment in the treatment program prior to age 5" (p. 25). According to Ozonoff and Cathcart (1998), several studies have shown that the feelings of stress and depression can be reduced and feelings of competence can be increased after having a home intervention. Parents of children/adolescents with ASD are a significant component of any intervention. They can help maintain the gains of the intervention, such as the reduction of stress and increase of appropriate skills of children/adolescents with ASD (Diggle & McConachie, 2009). In addition, Stahmer et al. (2010) stated that active participation and involvement of parents of students with ASD to insure effective interventions is a recommended and important component. Recently, research on family variables and how they interact with interventions has just begun (Stahmer et al., 2010).

Interactions between parents and education professionals are a significant component in the field of special education. One reason for this is the required involvement of parents in their children's education by the Individual with Disabilities Education Improvement Act (IDEIA, 2004) (Stoner et al., 2005, Yell, 2012). The collaboration between parents and practitioners is a significant component in any intervention for students with ASD. For example, Stahmer et al. (2010) indicated that if

practitioners and parents collaborate with each other to identify target behaviors and to determine the way that the treatment can be applied they can impact the reduction of problem behaviors for children/adolescents with ASD. Also, this collaboration can increase the confidence of parents after reducing their stress. In fact, there are a few researches that have been done to investigate the interaction between parents and education professional from perspectives of parents (Stoner et al., 2005).

Conclusion

As we have seen above, there are many effective interventions for students with autism spectrum disorder (ASD) that can be introduced and utilized at early time of their school life, so that could help them to stay at regular schools and learn with typical students. Also, that would help to improve special education services for students with ASD by having only those students who are really in need. I hope in near future that we see more researches and studies about using Response to Intervention model with students with ASD, specifically those who are able to learn and improve their academic skills like Dr. Temple Grandin here at United States.

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