Foundational Strategies for Elementary Students with Autism Spectrum Disorders

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Abstract

Throughout the literature there are discussions relevant to interventions and strategies that support elementary students diagnosed with an Autism Spectrum Disorder (ASD). There has not been discussion on types of strategies that are foundational and essential to have in place for the students upon entry into the elementary classroom. There is a lack of evidence research in the area of foundational supports that are essential and imperative for students with ASD to achieve academic success. The nine strategies discussed here are foundational. They are necessary supports that can then be built upon to design individual programming for each student with ASD. The nine evidence-based supports presented in this article represent specific categories based upon the most current research.

Keywords: autism spectrum disorder; classroom; evidence-based; foundational

1. Introduction

One of the current challenges of educating students with autism spectrum disorders (ASD) is the unprecedented and continued increase in prevalence [1]. In the early 1990's, autism was identified in approximately 3 to 5 per 10,000 individuals [2]-[5]. As of 2014, the current prevalence according to the CDC is 1 in 59 [6].

At the present time, education is the primary treatment for ASD [7]. All students with ASD require individualized planning which test school programs to provide inclusion for students with autism [8]. Research literature from 1980 through 2010 finds a wide variety of intervention and programs for students on the autism spectrum. Current literature reveals educational programs for students diagnosed with ASD need to address the following areas: social and social interaction skills, play/leisure skills, communication skills, adaptive behavior skills, behavior, motor skills, and sensory needs [9], [8]. Relative to their efficacy and proven utility these methods are often classified as "established practices, unestablished practices, and ineffective or harmful treatments" [10]. Increasingly there is evidence that some professionals in the field, especially researchers and academicians, are beginning to have a better understanding of which interventions are associated with the "best outcomes" for students with ASD, which interventions are considered "evidence-based practices," and which methods are based on research [1], [10], [7], [11].

2. HISTORY AND DIAGNOSIS OF PREVALANCE TRENDS

In 1980, the American Psychological Association first defined ASD within the DSM-III under its own separate class, Pervasive Developmental Disorders [12]. By the end of the 1980's the profession began to see an alarming increase in the diagnosis of autism spectrum disorders [3], [13]. In relation to autism as a diagnosis, prevalence as it appeared in research prior to 1985 was estimated at 4-5 per 10,000 based on Kanner's description of the "classic autistic prototype" [14]. By 2003, Volkmar and Pauls reported the prevalence rate had increased significantly to at least one (1) in 1000 children.

The Centers for Disease Control (CDC) is one of several organizations that monitors and tracks the number of individuals diagnosed with an ASD. CDC reports that ASD occurs throughout all ethnic, racial, and socioeconomic groups and is 4 to 5 times more likely to occur in males [6]. The CDC [6] has also shown concern over the increasing economic costs of raising a child with ASD, especially in relation to the increased prevalence of the disorder. In response, it created the Autism and Developmental Disabilities Monitoring Network (ADDM) [6]. This is the largest collaborative organization accessing multiple sites to attempt to obtain the latest data on prevalence. In 2007, the ADDM first reported an average of 1 in 150 individuals had a diagnosis that fell on the autism spectrum. Less than four years later, it updated its prevalence estimate to an average of 1 in 110 [15]. The most recent numbers reported in 2018 by the CDC stand at 1 in 59 [6].

A second agency tracking the prevalence of autism is the Autism Society of America [16]. ASA currently estimates that 1% of world population have an ASD, as well as being the fastest growing childhood developmental disability, with a growth rate of 1,148% since becoming a diagnosis [16]. Ludlow, Keramidas, and Landers [17] reported that over the previous decade children and youth with ASD were the fastest growing population of special education students. The ASA [16] estimates that the lifelong cost of raising, educating and caring for a single individual with ASD is $3.2 million. However, they also contended that this amount can be decreased by two-thirds with early diagnosis and use of effective interventions.

The United States Department of Education (USDE) and other groups have been tracking autism prevalence since autism became an educational classification in the Individuals with Disabilities Education Act of 1990 [18], [19]. The 1991-1992 school year was the first year all states were mandated to provide a count of the number of students with IEP's that listed a classification of autism [13], [19]. USDE reported in 1992 that 5,415 students were educated the first year under the "autism" classification. According to the most recent USDE prevalence statistics, students between the ages of three and 22 with an IEP that designated autism as the diagnosis dramatically increased from 15,580 in 1992 to 163,773 in 2003 (http://www.thoughtfulhouse.org/tech-labs/disabilities/reports/US-Autism-Statistics-Prevalence-Incidence-Rates.pdf, April 23, 2011). Polyak, Kubina, and Girirajan, in [20], "found a 331% increase in the prevalence of autism from 2000 to 2010 within special education." The continued increase of students in special education with an autism label has not yet leveled off, suggesting that the increase in the rate of autism is not the result of the IDEA classification [13], [21].

3. EDUCATIONAL PROGRAMMING

3.1. Implications of Increasing Prevalence on Educators

With the ever increasing number of students with an autism spectrum disorder enrolled in public educational settings [22], [16], [5], [8], it is imperative that educators identify a main set of interventions and strategies that benefit all students on the spectrum. This need is a first step to providing an appropriate education for all learners with ASD [23], [24].

Students with ASD are placed in both self-contained and resource room settings as well as inclusive general education settings [25], [9], [17]. Thus, fundamental interventions and supports for students in a range of educational settings are needed [9]. To be sure, knowledge of foundational interventions that will serve as the underpinning for an effective education for all students with ASD is needed [26].

"Determining effective ways to deliver instruction in the field of ASD is a critical concern" [25], [9], [17]. With the continued increase in the diagnosis and prevalence of ASD, there is a corresponding increase in need for teachers of students with ASD. Simpson, et al, stated the importance for students on the spectrum to have individualized yet careful planning of interventions and strategies for our students to demonstrate academic success [8]. The article provides information on how to collaborate with team members on a wide variety of topics including interventions and strategies, yet it does not include which are foundational in the educational setting for all students on the autism spectrum.

Lang, et al, emphasizes the need for teachers implementing appropriate interventions for students with ASD, but he also did not provide foundational interventions [1]. Consequently, teachers often choose interventions and strategies on the basis of what seems most feasible in their classrooms rather than those with the best research base [1]. Since federal and state agencies have not set a single standard, it is imperative that experts in the area of educating persons with autism spectrum disorders create a professional development program. Such a program should focus on developing ASD skill competencies and using interventions and strategies accepted in the field as evidence-based practices [25]. The focus then becomes a question of what are the foundational set of skills that will be functional and most appropriate if used with all students diagnosed with ASD.

3.2. Response-to-Intervention (RtI philosohphy)

One of the most significant changes in US education policy defined by Every Student Succeeds Act (ESSA; formerly No Child Left Behind Act,) has been a strengthened requirement that educators and public educational agencies use interventions and programs that are derived from "Scientifically Based Research" (SBR). NCLB [27] used the term "scientifically based research" 111 times [11]. NCLB defines SBR as "…research that involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs [27]." Essentially what this definition is stating are that programs and interventions have been determined through a research process, especially randomized trial research design methods, to be effective. As a result, current educational research in the field of ASD increasingly focuses on identifying and applying scientifically based research methods, including those that lead to desired outcomes for learners with autism-related disabilities [28].

Working with students diagnosed with ASD requires that all areas of the student's disability be

addressed in order for the student to be successful. In other words, educational settings must address all of the needs an individual on the spectrum demonstrates, not solely academics. This has become part of the challenge professionals face due to the change in laws.

During the reauthorization of the Individuals with Disabilities Education Improvement Act (IDEIA) in 2004, the term Response-to-Intervention (RtI) made its initial appearance [29]. RtI is based on a tiered intervention system of support where each tier provides services by matching the level of intervention for each student. Each tier provides increasing levels of support with increasing intensity of the interventions according to the level [30]. One basic element of the RtI model is the foundational tier where interventions and programming addresses the needs of 80% of the population [31], based on the concept that core instruction is differentiated to meet the needs of each learner [32]. If the philosophy of RtI is applied to the entire population of students identified with ASD, one could presume that foundational and core instruction that has previously been defined as evidence-based interventions for autism would address the needs of 80% of this population spread across all three tiers.

Barnes and Harlacher define RtI as a set of principles based on a static core foundation [31]. RtI is foundational in nature; it uses a tiered model to identify best-practices, what interventions and strategies are successful for individual students, and which professional development areas take priority [32]. RtI is also foundational in nature in that it is based on a service-delivery model with continuous data guiding placement rather than being an assessment tool to determine student programming needs [31]. As part of the IDEIA of 2004, many states have begun adopting the RtI process to help raise achievement of all students [33], [32].

To understand the foundational nature of RtI, the essential elements of the philosophy must be defined. The RtI process was founded in the construct of applied behavior analysis and disability research during the 1970's [34]. Vanderheyden defines RtI as a framework in which educational decision making is aimed at improving learning for all students [35]. RtI is method of measuring a student's performance when they are provided with scientifically based interventions [36]. It is a tiered approach which provides interventions at their individualized "needs" level of students based on these five basic principles: 1) a proactive and preventative approach to education, 2) ensuring an instructional match between student skills, curriculum, and instruction, 3) a problem-solving orientation and data-based decision making, 4) use of effective practices, and 5) a systems level of approach [31]. In other words, RtI is an individualized approach to determine which students need what services with how much intensity [37].

Witsken, Stoeckel, and D'Amato have begun to link neurological conditions and behavior to the RtI process in order to improve instructional models and learner outcomes [38]. They define this as a *Neuropsychologically Based RtI Model* where the approach focuses on processing difficulties [38]. This adaptation of RtI does not focus only on curriculum but also focuses on neuropsychological processes such as short-/long-term memory, attention, and executive functioning skills. Autism is a neurologically based disability [10], [7], so the assumption would be that we are then able to look at interventions and supports that are known to be successful in the area of autism and apply them into a multi-tiered model.

The philosophy of RtI if applied to autism spectrum disorder would then address all domains affected by ASD, including visual and environmental supports, social skill supports, and sensory supports concurrently

with cognitive/academic and behavioral supports. Further support for RtI use comes from the National Autism Center [10]. Though the Center does not specifically discuss use of the RtI process in its review of ASD interventions, it does use core terminology such as "system-wide improvements, universal screening, research-based interventions, early intervention, fidelity of instructional interventions, high-quality classroom instruction, on-going professional development and continued progress monitoring" [10] which Berkeley, et al. in [33], used to define RtI. In the applying of the basic principles of Response-to-Intervention core principals and philosophy as described, a logical connection then can be made between RtI and autism (see Figure 1).

To begin creating a tiered model for ASD, the initial step must be to identify which interventions would be foundationally and minimally necessary for all students with an ASD as seen in the RtI philosophy. Interventions in the primary tier must be based on the foundational and core needs of a majority of the ASD population. This must include the elements of: following class routines, reducing challenging behaviors, increasing time on-task, increasing communication skills, providing social skill supports, and supporting each student academically. Forethought should be given to the understanding that the concept of RtI when used as a set of principals rather than as a narrow or constricted model when implemented appropriately and with fidelity may decrease the 'research to practice' gap through the utilization of evidence-based practices specific to students on the spectrum [31].

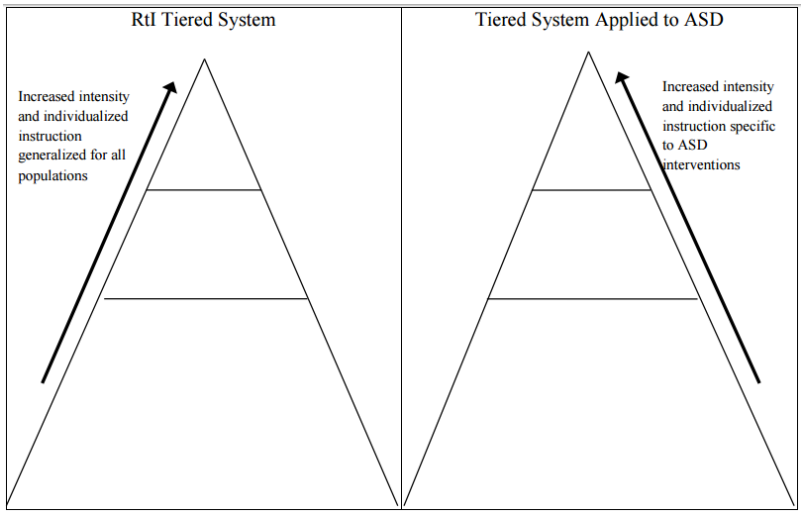

Fig. 1: The RtI tiered system as applied to the autism spectrum

3.3. Foundational Interventions

The complexities of increased prevalence of autism spectrum disorders (ASD), challenges of educating learners with ASD, and policies and recommendations calling for use of scientifically based methodologies create demand for improved understanding of specific foundational elements and interventions that educators should use with all learners with ASD. This understanding is critical in creating and implementing maximally appropriate and individualized programs for students with ASD.

The unique characteristics of students with ASD, the substantial increase in the prevalence in ASD, and a current push in the field of special education to use scientifically-based programming have led experts in the field of ASD to focus more attention on identifying interventions and support strategies that are most

effective [39], [11], [19]. Experts in the field have attempted to determine which interventions and strategies align with scientifically-based or evidence-based practices [10], [7], [24]. For example, in 2001 the National Research Council offered recommendations on educating young children with autism [7]. Simpson, et al, in 2005, published a text evaluating commonly used interventions and strategies [40]. Then in 2009, the National Autism Council also published research evaluating interventions and strategies [10].

4. NINE COURE FOUNDATIONAL INTERVENTIONS AND STRATEGIES

The nine core foundational evidence-based supports and educational interventions have been compiled from a research survey, The National Research Council's *Educating Children with Autism* [7], and National Autism Center's (NAC), *Evidence-based practice and autism in the schools: A guide to providing appropriate interventions to students with autism spectrum disorders* [10].

Experts in the area of autism used the original survey to determine what interventions classroom educators were implementing [40]. This survey was diagnostic and evaluative in nature, and was used as a guide to assist teachers of students with ASD determine what interventions and support strategies were needed and appropriate for students with ASD.

In order to create a core foundational list representing current evidence-based interventions in the field of autism, the National Research Council [7] and the National Autism Center's [10] manuals were used. The National Research Council's *Educating Children with Autism* [7] provides information on interventions considered to be evidence-based and appropriate for use in educational settings. It also provided the first standards on goals for children and families and characteristics of effective interventions. The final item used to help create the core foundational interventions was the National Autism Center's (NAC), *Evidence-based practice and autism in the schools: A guide to providing appropriate interventions to students with autism spectrum disorders* [10] which provides information on interventions considered to be evidence-based and appropriate for use in educational settings. The NAC's [10] manual provided information on educational and behavioral interventions that are appropriate for students with ASD based on age, skill level, and treatment targets.

Combining the information from the survey [41], the NRC's manual [7], and the NAC's manual [10] defined the intervention categories in the following nine general domains: 1) *Collaborative Teaming*, 2) *Human and Other Resources*, 3) *Classroom Structure*, 4) *Academic, Pre-Academic and Cognitive Supports*, 5) *Social Skill Supports*, 6) *Challenging Behavior Supports*, 7) *Family Participation*, 8) *Communication Supports ,* and 9) *Sensory Supports*.

4.1. Collaborative Teaming

"Collaboration has been a central element of successful education for many years" [42]. Collaboration places an "emphasis on shared responsibility and shared decision making among general educators, special educators, related services personnel, and parents and families" [43]. The responsibility of teaching in a collaborative team is placed on all adults within the school system instead of placing all of the responsibility and authority with one individual [44]. As further support for collaboration, the Individuals with Disabilities Education Improvement Act provides that team collaboration increases

opportunities for "promoting effective case management and collaboration among parents, teachers, physicians, related services personnel, behavioral specialists, principals, administrators, and other school staff" [29], 20 U.S.C., §665(b)(2)(G).

Collaborative teaming is generally considered to be an important provision for students with ASD because it enables and supports professionals in their efforts to design, implement and evaluate individualized and evidence-based programs [7]. Professionals involved in collaborative teaming provide input in their respective areas of expertise and jointly share decision-making responsibility for determining which interventions and strategies are most appropriate for individual students [28]. Thus, in order to provide a successful education for students with ASD, collaboration between educators and related-service providers is crucial [28], [43]. Moreover, it is important that there be collaborative input and teaming from a variety of disciplines [10], [28]. The National Autism Center further states that teams should be skilled in addressing all student domains wherein individualized interventions are required [10]. Finally, as the number of students with ASD being educated in public school settings continues to rise, the need for collaborative relationships is increasingly being recognized [43].

4.2. Human and Other Resources

"Even prior to the passing of the first special education law in 1975, special educators were an integral part in providing indirect services to students with disabilities working with general education teachers" [42]. Individuals responsible for the education of students with ASD need an eclectic repertoire of skills, knowledge and other assets, including interventions and strategies specific to ASD [43]. Utilizing professionals from a variety of backgrounds brings increased knowledge and expertise into individualized planning for students [42].

4.3. Classroom Structure

Classroom structure, including environmental supports, are used to increase student learning and include all aspects of the educational environment except for people [45]. The physical structure of a classroom creates the basic learning space foundation which positively impacts student learning [28]. "Environmental supports help organize students' physical space in ways that facilitate their ability to predict events and activities, anticipate change, understand expectations, and in general, make sense of the world" [43].

Research indicates that students with ASD have strengths in visual processing and therefore benefit from well-defined boundaries within the educational environment [28]. When creating structure within the classroom, the majority of students with ASD need the physical environment to be organized in a manner that visually communicates boundaries while simultaneously facilitating engagement in learning opportunities [28]. The classroom environment should be arranged in a comprehensive manner understandable to the student with ASD. Such an arrangement must align the environment, learning materials, and educational activities to clearly depict expectations of the provided learning opportunities [46]. Heflin & Alaimo urge that the classroom structure should be arranged for students with ASD "so that the expectations of the activity are obvious establishing a clearly defined, depicted, and predictable

temporal structure with activities that last the appropriate length of time for each student, providing assistance which maximizes engaged time and minimizes instructional time lost to disruptive behavior while at the same time teaching change and flexibility in routines" [28].

"Physical organization of the classroom can play a crucial part in enhancing success for all students and is particularly important for students with ASD, who tend to react negatively to change and uncertainty in their environment" [43]. Furthermore, "structure and predictability facilitate students' understanding of environments, thus decreasing the likelihood of worry and agitation" [43]. The respondents' perception of increased and continuing need for classroom supports as students with "classic autism" age versus the decrease in need for students with "higher functioning autism" may be due to differences in how educators program for the individual characteristics of each type. Students with "classic autism" continue to need intense interventions and supports through all skill domains as they age. Throughout the age range, they will require significant supports by speech therapists in order to develop functional communication skills; behavioral specialists must address inappropriate and sometimes aggressive behavior; and special educators must continually work on developing adaptive skills, life-skills, and social skills. In order to provide the most supportive environment possible for these individuals, educators will need to provide intensive classroom structure that is visually oriented through the use of furniture, visual schedules, work tasks or boxes, and visually structured materials. This type of structure will be necessary at all ages. Educators working with students diagnosed with "higher functioning autism" will often be able to begin decreasing the intensity of classroom structure as students advance through the grades. One example might be to replace task or work boxes and with folders or a 3-ring binder. Another example might be to provide minimal visual schedules or an entire classroom schedule rather than intense task analyzed daily schedules. As students with "higher functioning autism" advance in age classroom structure and supports are modified to reflect the increased the level of independence shown by these students.

4.4. Academic, Pre-academic, and Cognitive Supports

A variety of empirical studies have substantiated the effectiveness of evidence-based strategies in promoting the development of learning and academic achievement skills for students with disabilities [28]. Many characteristics and challenges within the disability area of ASD affect both the aspects of thinking and learning [7]. Students diagnosed with ASD will enjoy increased learning and achievement when their educators use instructional strategies both differentiated by the general characteristics of autism and tailored to the individual student [9].

Students with ASD need to acquire many of the same skills as neurotypical students, yet their unique developmental deficits related to the triad of characteristics of ASD (i.e., deficits in communication, social, and behavioral) often present increased challenges for educators [28]. Therefore, curricula appropriate students with ASD must include both instruction within this core triad of characteristics and academic instruction [7]. When educators determine objectives to address academic deficits, they need to be both developmentally appropriate and curriculum-based as defined by state standards [28]. Based on their research, experts in the field of autism spectrum disorders have defined "classic autism" as individuals with the co-morbidity of an intellectual disability creating further difficulty in the area of programming for

academics, pre-academics, and cognitive skills [28]. Learners with "higher functioning autism" can be expected to experience academic performance problems due to difficulties with comprehension of abstract information, discriminating between relevant and irrelevant information, and the understanding of inferentially based materials though "teachers often fail to recognize the special academic needs of these students because they often give the impression that they understand more than they do" [47].

4.5. Social Skill Supports

Most social, cultural, and family behavioral norms are unwritten, understood implicitly (rather than explained explicitly), and generally enforced nonverbally. As a result, experts agree that the cognitive process of decoding and interpreting these norms are difficult for many neurotypical persons. Research and experience both demonstrate that students with ASD find these processes even more challenging. [9]. "The social understanding that appears to come naturally to neurotypical individuals is often elusive for individuals with ASD as they appear either disinterested in social interactions or desperately interested yet unable to engage successfully" [28]. One of the most challenging deficit areas to address with a student diagnosed with an ASD is social interaction deficits [9].

"Elementary-aged students with ASD are perceived as having a significantly restricted range of both social communication and initiation skills used to engage in reciprocal social interactions" [43]. Children with ASD also demonstrate impairments in "relationships to peers, the use of nonverbal communicative behaviors within their social exchanges, the use of imitation, and symbolic or dramatic play" [7]. Research has indicated a correlation between an increase in a student with ASD's social skill abilities and increased social validity in relation to overall quality of life, friendships, employment, and independent living (Simpson & Myles, 2011). To be perceived as socially competent, students with ASD must "learn not only a wide range of social interaction and language skills but also demonstrate the ability to use these skills effectively within a variety of social situations" [43]. As such, students with ASD need assistance in learning, using, and generalizing appropriate social skills with adults and peers [9].

4.6. Challenging Behavior Support

Challenging behaviors are among the most overwhelming and stressful issues faced by schools [7]. Possibly the most daunting issue in both general and special education classrooms is dealing with challenging behaviors in a manner which facilitates learning [28]. Educators report that the challenging behaviors students with ASD display are both more intense and more pervasive throughout the day than those used by neurotypical peers [46].

"All students with an ASD struggle with challenging behaviors" [9]. Once a behavior has become an established part of an individual's repertoire, they will not outgrow that challenging behavior [7]. Examples of challenging behaviors often exhibited by students on the spectrum include aberrations of social interaction, self-stimulatory behavior, over activity, and marked preoccupation with restricted and stereotyped response patterns [43]. Glasberg noted that students with ASD use these and similar challenging behaviors to meet a perceived need, similar to ways their neurotypical peers might use verbal communication to express their own perceived needs [48]. When educators respond to these behaviors,

meeting the student's need, they reinforce the behavior pattern. This conditions the student to continue using the challenging behaviors to meet future perceived needs.

Students with "higher functioning autism" do not have "typical conduct problems but rather demonstrate behaviors through social ineptness, stress, anxiety, an obsessive and single-minded pursuit of a particular interest, and/or a defensive panic reaction" [47]. Challenging behaviors of students with higher functioning autism often involve "feelings of stress, anxiety, fatigue, and pressure to perform within set time and expectation parameters, or loss of control or inability to predict outcomes" [47], resulting in their being described by others as "socially awkward, emotionally flat, socially unaware, self-absorbed, lacking in empathy, insensitive, or unaware of verbal and nonverbal social cues" [47]. Students with "classic autism" demonstrate more intense behaviors such as compulsive behaviors (e.g., ordering, rearranging, walking and pacing, etc.), stereotypic movements (e.g., hand and arm flapping, repetitive jumping, head shaking and weaving, and body rocking), and self-injurious behaviors [49]. Heflin and Alaimo found that educators tend to regard challenging behaviors associated with "higher functioning autism" as significantly less severe than those exhibited by students with "classic autism" [28]. These behaviors demonstrated by students with HFA, though problematic typically do not disrupt educational learning to the level of those exhibited by students with "classic autism." Specifically, students with "classic autism" are often non-verbal or have minimal verbal communication skills; they present unique challenges relative to understanding what the behavior is trying to communicate, often resulting in more intensive assessment to determine the function of the behavior. In regards to self-injurious behaviors seen in students with "classic autism," educators must respond immediately as opposed to students with "higher functioning autism" whose behaviors are not physically harmful. These perceptions may influence the results seen in the statistical analysis if the respondents' perceptions reflect those described by Heflin and Alaimo [28].

4.7. Family Participation

"Autism is a disability that is present from birth or very early in childhood development which affects essential human behaviors (i.e., social interaction, ability to communication, relationship building, and imagination) which are generally life-long" [10]. "Parents are experts in regards to knowing the strengths and weaknesses of their child diagnosed with an ASD" [10]. The understanding by educational professionals that parents play a key role in effective treatment of their child greatly increases the benefits and outcomes for the child [10]. Collaborative partnership with families enhances the effectiveness of interventions by ensuring that interventions and strategies are implemented in a variety of settings and contexts, including home and the community [46]. Enhancing the amount of family involvement increases the generalization of skills learned across environments [46].

Awareness of the impact of autism on parents and families is essential for providing adequate support because a child diagnosed with an ASD affects the family's structure, interactions, functions, and life cycles [50]. Research has established that the presence of a child with autism within a family system may exacerbate other type of problems the family might encounter, thus rates of divorce are higher than for families without children with ASD [50]. "Appropriate family supports can reduce stressors" [10]; therefore family priorities need to be addressed as well as actively engaging the family in the intervention

planning process [46]. "In order to assist in providing an appropriate education for their child, parents of children with autism need specialized knowledge and skills and scientifically based information about autism and its treatment" [7].

4.8. Communication Supports

"Communication has been defined as the ability to receive, send, process, and comprehend concepts of verbal, nonverbal, and graphic symbol systems" [28]. All students diagnosed with an ASD have some degree of deficit in nonverbal and verbal communication skills needed to function successfully in a classroom [9]. "In regards to deficits that occur in individuals with ASD it is important to understand that they are best characterized as deficits in communication rather than deficits in speech" [49].

By definition autism includes social communication impairments [51], including "deficits in nonverbal communicative behaviors used for social interaction, ranging for example, from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding use of gestures; to a total lack of facial expressions and nonverbal communication. Students with "classic autism" typically lack functional communication skills which then may elicit severe problem behaviors when they are frustrated by the inability to communicate effectively (e.g., such as when something hurts, when they are hungry or thirsty, or when they do not want something) [9]. When students do not develop functional communication the problem behaviors which develop are often idiosyncratic, unconventional, or inappropriate, and include self-injurious behavior, aggression, or tantrums [7].

Students with "higher function autism" "typically do not manifest clinically significant delays in language and tend to speak fluently by the time they are five" [47]. Communication difficulties for these students include "problems with reciprocal conversations, limiting conversations to a small range of topics and interests, inability to initiate and/or maintain conversations, and appearing to talk at others rather than talking with listeners…tend to talk more like adults than peers having a bookish quality in which the speaker uses formal and obscure words rather than relying on colloquial or less formal speech" [28]. "Nonverbal communication deficits and related social communication problems are common among persons with "higher functioning autism" (i.e.,, standing too close while speaking with another, making unusual gestures or movements with talking, intensely staring at another person for long periods, failure to make eye contact, displaying an inexpressive face, failing to understand gestures and facial expressions)" [47].

4.9. Sensory Supports

The human sensory system begins to form prior to birth and continues to develop throughout the early childhood years [52]. The sensory system provides information to the brain from the environment. This information helps our body interact within that environment [46]. The sensory system is a portion of the central nervous system [28] that helps our brain gather information regarding ourselves and the environment and also creates awareness within our bodies which helps interpret the environment [53]. "Scientists in the fields of neurology, physiology, biology, anatomy, and so forth, as well as researchers interested in understanding the experiences of individuals with disabilities, describe how people register

and use sensory information otherwise known as sensory processing" [28]. According to the NRC (2001) "sensory processing may be related to other aberrant behaviors and core features of ASD.

"Sensory processes take place at an unconscious level, occurring simultaneously in the various sensory systems which the brain stores, sorts, and compares allowing individuals to move, express feelings, have self-esteem, learn, interact with others, and attend to a task [52]. ASD-focused research studies on the sensory system indicate that between 42-80% of individuals diagnosed with an ASD respond unusually to sensory input [28]. The understanding of "sensory-processing" may contribute a fuller understanding of the maladaptive or aberrant behaviors of children with ASD [43]. Individuals with an ASD may have difficulty processing sensory input causing difficulties which may affect "a child's daily routine activities, create problems with mealtime, bath time, playtime, bedtime, transitions, peer interactions, dressing, and learning" [52].

5. Conclusion

Research in special education indicates that there is both a shortage of teachers in the area of ASD and a lack of personnel trained specifically to educate this population [54]. The lack of specialized pre-service programs for personnel working with the ASD population is exacerbated by the lack of on-going professional development available to educators in the field about which interventions and programming allow students to be successful [26]. As a result of the recent regulations of ESEA (2002) and IDEIA (2004), the burden to ensure personnel are trained to provide appropriate, effective strategies for students with ASD falls on the local educational agency (LEA) [26]. As a result of this problem in pre-service and on-going professional development, the most popular classroom placement for students with an ASD is a self-contained classroom even when it may not be the most appropriate placement. Approximately 50% of such students are placed in these self-contained classrooms [55].

The dramatic increase in the last decades has created intense demand for educational services and programs for learners with ASD, including maximally effective and appropriate interventions and services [1], [8]. The CDC's Autism and Developmental Disabilities Monitoring Network indicates that 80% of students with ASD receive services through special education settings [56]. To be sure, identifying and using appropriate and evidence-based methods is a significant issue in the field. The aforementioned changes have particularly strong implications for the education of children and youth with autism spectrum disorders (ASD). This includes the need for classroom programs providing the foundation of basic educational skills as well as the specialty skills specific to the area of ASD's utilizing the most current research.

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