

Chapter 2

Educational Programming for Students with Autism Spectrum Disorders: A Review of the Literature and a Program Development Protocol

Several factors challenge schools to develop high quality educational programs for students with ASD. These include features of the disorder, legal mandates in special and general education, the range of program models and interventions published in the literature, and the lack of clear procedures for translating research findings into practice. This chapter seeks to assist readers with gaining an understanding of what constitutes effective practice in ASD educational programming. The chapter begins with a brief review of the most common treatment models and scientifically based practices in ASD intervention. It critically examines the evidence and presents considerations for evaluating current, new and emerging practices. Next, the chapter identifies the key elements of effective practice and defines the components of the *ASD Program Development and Evaluation Protocol* (Magyar, 2006) used to develop the ASD Program Model that is described fully in Section II of the book. This knowledge, combined with information on student characteristics reviewed in Chap. 1 establishes the foundation for the program development and evaluation practices presented in the chapters that follow and are an integral part in helping schools to meet the federal mandates in educating students with ASD.

Factors Affecting Educational Programming for Students with ASD

Autism is one of the few disorders of childhood in which the primary treatment is provided within the context of an educational setting, whether in a home-based setting for young children, or a school-based program for older children and youth. Once considered a rare disorder, the increasing prevalence of ASD and the concomitant rise in the number of children classified as Autistic has placed great burden on schools to provide a free and appropriate public education (FAPE) in the least restrictive environment (LRE) for all their students with ASD. Moreover, in recent years the government has increasingly held schools accountable for

student achievement. According to No Child Left Behind (NCLB, 2001) federal funds can only be expended to support educational activities that are backed by scientifically based research. This stipulation conveys the notion that schools must apply instructional practices that have been demonstrated to improve student achievement.

Both FAPE and NCLB requirements have proved challenging for many school personnel working with students with ASD for two reasons. One, most school personnel will not have received adequate coursework and/or training in ASD and therefore, may not understand student learner characteristics, know how to validly assess instructional levels and other student intervention needs, or know what program models and/or intervention practices are considered effective or evidence-based. For example, a recent survey found that public school personnel do not routinely use evidenced-based interventions for students with ASD (Hess, Morrier, Heflin, & Ivey, 2008). Moreover, even for those school personnel who may have knowledge and experience in ASD education, the wide variability in symptoms across students and the age span and constantly emerging evidence-based practices can challenge them to maintain knowledge and skill in providing a wide range and intensity of interventions based on student need, and changing and adjusting those interventions over time as the student develops and progresses/regresses.

Two, contextual factors can impact whether or not a program model or intervention derived and evaluated in the context of research can translate to the field and become a part of the daily instructional repertoire of school personnel. A new program model or intervention is more likely to translate to practice if it is clearly understood by personnel, is easy to apply within the daily classroom routine (Gersten & Brengelman, 1996), meets the needs of the student, and is supported by the school context. Thus, successful development of an ASD program requires school leaders to identify the needs of their students, identify elements of effective practice in ASD, and identify elements of the school context that ensures the translation of research to practice and supports the development and maintenance of the ASD program. Chapter 1 reviewed the general learner characteristics of students with ASD providing the reader with a basic understanding of the types of educational and behavioral needs of this group of learners. Next, a review of the ASD treatment literature is presented to describe what practices are considered to be effective in meeting student needs.

A Brief Review of the ASD Intervention Literature

A review of the ASD treatment literature indicates two broad treatment models have been published in the literature, *comprehensive treatment programs* and *specific interventions*. This section reviews both types of treatment models, their theoretical orientation, and the different research methods that have been used to

study their effects. Readers are encouraged to review original sources for more detailed and specific information.

Several reviews of the ASD treatment literature have been conducted over the past 15 years (e.g., see Howlin, Magiati, & Charman, 2009; Harris, Handleman, & Jennett, 2005; Odom et al., 2003; Iovannone, Dunlap, Huber, & Kincaid, 2003; Helfin & Simpson, 1998 for examples) and indicate that autism intervention research can be divided into two types of studies: those that describe and/or evaluate comprehensive treatment programs and those that describe and/or evaluate individual intervention methods. Each is described below.

Comprehensive Treatment Programs

Comprehensive treatment programs are defined by their focus on improving overall functioning of the child and use of various interventions for multiple skill domains over relatively long periods, often 2 years or more. Most comprehensive treatment programs described in the literature are university affiliated or university based. But, some programs, usually in the form of self-contained classrooms, may also exist in public schools and are developed and supported by consultation from university program faculty (see Harris et al., 2005 for a review). All programs reviewed here acknowledge the importance of having parents play a role in intervention, but programs vary on how they support family participation (National Research Council (NRC), 2001).

Programs also vary with respect to their underlying theoretical models. These theoretical distinctions are important because they define the philosophy and elements of the program (important aspects of school context), which drive the selection of targets for intervention and the intervention methods used. The most commonly applied models in ASD treatment include those based on a *developmental* perspective, those based on *applied behavior analysis* (ABA), and those that *combine* elements from both of the predominant theoretical orientations.

Understanding the elements of each of the models, and the similarities and differences is important for school personnel in determining which program model, program elements, or interventions will fit their unique school context. Theoretical alignment is essential between the model and/or methods chosen and the training background and philosophy of school personnel to ensure that the ASD program fits within the larger school context and can be developed and implemented with good integrity and sustained over time. This contextual fit will affect student outcome and increase the probability that the school will meet the mandates of IDEA and NCLB.

Programs that apply a *developmental model* (e.g., DIR[®]/Floor Time[™]) conceptualize the student with ASD from the perspective of typical developmental processes and its deviations. Through examination of the student's capacities in the different developmental domains (e.g., cognitive, language, sensory etc.), the adult gains an understanding of the child's needs in terms of unique developmental

profile and the interplay between the student's capacities and the context in which development occurs (e.g., family, social, school etc.). Intervention methods are derived from research on typical adult-child interactions (e.g., emotional engagement with parent, orienting to people, encouraging communication through play-based activities) and are selected based on the student's profile of needs, with a focus on targeting core features of ASD. Program models vary slightly in their relative emphasis placed on developmental areas (e.g., social, emotional, communication), but most program models target the core features of ASD such as social communication, with the presupposition that intervention aimed at ameliorating core deficits will yield changes in other developmental areas.

The second type of program model and by far the most commonly described in the scientific literature apply a *behavioral model* (e.g., Young Autism Program-UCLA, Douglass Developmental Disabilities Center). In these programs, intervention and evaluation methods derived from an applied behavior analytic framework are used to make socially significant changes in a student's behavior. Behaviorally based programs typically conceptualize ASD in terms of behavioral deficits (e.g., language, social skills), behavioral excesses (e.g., hand flapping, repetitive behavior), and behavioral inappropriateness (e.g., asking inappropriate personal questions, yelling and laughing out loud in a place of worship). Interventions are selected based on the need for the establishment of a discrete skill or skill set, and/or the reduction of a discrete behavior. Discrimination training techniques are used liberally, and emphasis is placed on training for generalization of skills to new people and settings. Instruction often initially occurs in a distraction free context, than moves out to more naturalistic settings that may or may not include peer models.

A few comprehensive program models apply a *combination* of the developmental and behavioral approaches. For example, the Treatment and Education of Autistic and Related Communication and Handicapped Children (TEACCH) program in North Carolina. This is a statewide program supported by the state legislature and regional technical assistance centers. The Denver Model is another combined model. Table 2.1 provides a description of the developmental and behavioral models and identifies the basic elements of both.

In all three of these comprehensive program models, the primary location for intervention varies, often determined by student age and functioning level. Intervention locations include home-based programs for very young children, where the majority of the student's initial instructional hours are provided in the home by a team of educational professionals, with subsequent integration of the student into a school setting as he/she ages out of early childhood. In center-based programs, services are provided within a specialized setting, typically a university-based or -affiliated research program. In school-based program models, specialized programming is provided through the public school, often with ASD specific consultation to the school-based team. In all of the program models, a variety of effective educational practices is utilized, and parent training and involvement is considered an integral component of the student's educational program. Table 2.2 provides a brief description of some of the more popular comprehensive treatment programs identified in the literature and includes information on the theoretical

Table 2.1 Theoretical frameworks applied in the Design of Comprehensive Educational Programs for students with ASD**Theoretical framework and elements*****Developmental model***

In this model, autism is viewed in the context of typical child development. Practitioners examine how different abilities of the student emerge over time and note any deviations from normal development. In treatment selection, the practitioner considers the interplay between student abilities and those abilities and the instructional context

Elements

Considers all developmental areas

Integrates information on the student's biological, cognitive, emotional, and social systems to guide intervention planning

Views the student as unique, with idiosyncratic ability profiles

Targets core deficits of the disorder for broader impact on developmental outcome

Instructional targets follow a developmental progression and therefore tend to align with most educational curriculums

Student plays a role in his/her own development

Intervention focuses on teaching the student self-regulation and self-organization

Behavioral model

In this model, autism is defined in terms of behavior or skill domains and viewed in terms of skill deficits, excesses, or inappropriateness. The behavioral model applies the scientific method to understanding the functional relationship between environmental contingencies and behavior.

Through the application of scientifically derived principles of learning, target behaviors are identified, interventions applied, and data are used to evaluate response to treatment

Elements

Operationally defined instructional targets

Systematic sequence of intervention

Addresses multiple skill areas simultaneously to develop functional skill repertoires

Applies multiple instructional strategies

Individualizes student curriculum

Uses data obtained from on-going student assessment to adjust and/or modify intervention

Applies a combination of teacher directed and student directed instructional formats

Programs specifically for generalization of skills across people and places

model, unique program elements, and some general information on outcomes or evidence of effectiveness. Examination of these programs and their features can provide the reader with an understanding of the similarities and differences among the programs and the relative strength of the evidence of their efficacy.

Specific Intervention Methods

Specific intervention methods are defined by their focus on the treatment of core and related features of ASD, often using single-subject design research methods (Smith et al., 2007). Specific intervention methods may derive from multiple theoretical perspectives but are often developed and/or applied and evaluated within the context of comprehensive programs (described above) because they provide the most

Table 2.2 Common Comprehensive Educational Program Models for children with autism

Type of program/ theoretical model	Age range	Description	Comments on evidence base
<i>Home-based</i>			
Young Autism Program (YAP-UCLA)- University of California at Los Angeles (behavioral)	Early childhood	Established 1980s 40 h per week for two or more years Sequenced curriculum: teaching developmentally disabled children: the Me Book Inclusion in later stages of treatment	Widely applied early intensive behavioral intervention program model Original study by Lovaas (1987) replicated by Smith, Groen, and Wynn (2000); replication study findings not as robust as original This program model is one of the best studied comprehensive models and has some evidence to indicate that it works for some children Specific methods used within the model (e.g., discrete trial teaching, differential reinforcement procedures) have evidence to support their use
Pivotal Response Training (PRT)- University of California Santa Barbara (behavioral) Website: http:// education.ucsb.edu/ autism/	Early childhood	Established 1990s Intensive parent training in PRT Naturalistic approach (Natural Language Paradigm) Teaches pivotal skills: responding to more than one cue; motivation to respond, self- management, self- initiation	Naturalistic approach/ incidental teaching method is a large component of this program model. This method has the most support for its efficacy Program model requires more systematic study to determine strength of evidence
<i>Center-based</i>			
Children's Unit for Treatment and Evaluation-State University of	12 months to 12 years with ASD (includes programs for	Established 1975 one of three units- Department of Psychology	No comprehensive or systematic scientific evaluation of the

(continued)

Table 2.2 (continued)

Type of program/ theoretical model	Age range	Description	Comments on evidence base
Binghamton (Behavioral) Website: http://icd.binghamton.edu/	other emotional and developmental disorders)	12 month, full-time programming Intensive, empirically based, child centered Sequenced curriculum- individualized goal setting (IGS) 19 developmental areas and linked assessment system	program has been published. Outcomes focus on individual student progress and school placement The program has multiple elements which are well specified including student assessment protocol, parent and staff development, standardized curriculum, and student evaluation protocol The program follows an applied behavior analysis model, and therefore, applies many individualized intervention methods that have demonstrated effectiveness
Alpine Learning Group (Behavioral) Website: http://alpinelearninggroup.org/	3–21 years	Established 1989 12 month, full time programming Comprehensive staff development model Continuum of programming through adulthood Provides outreach in the home setting	Outcomes focus on individual student progress and school placement Program evaluation reportedly occurs once per year and measures consumer perception of effectiveness of intervention and the quality of consumer- personnel interactions The program has multiple elements including student assessment protocol, parent and staff development, standardized

(continued0)

Table 2.2 (continued)

Type of program/ theoretical model	Age range	Description	Comments on evidence base
			curriculum, and student evaluation protocol
			The program follows an applied behavior analysis model, and therefore, applies many intervention methods that have demonstrated effectiveness
Walden Early Childhood Programs-Emory University (combination) Website: http:// www.psychiatry. emory.edu/ PROGRAMS/ autism/Walden.html	Early childhood	Established 1985 University of Massachusetts/ 1991 Emory University School of Medicine Early childhood continuum Social communication, incidental teaching Parent-professional collaboration	The program applies an incidental teaching approach which has demonstrated effectiveness Outcomes focus on individual student progress and school placement. However, no comprehensive or systematic scientific evaluation of the program has been published The program contains elements which are well specified including student assessment protocol, parent and staff development, standardized curriculum, structured learning environments, and student evaluation protocol
Princeton Child Development Institute (Behavioral) Website: http:// www.pcdi.org/	Birth through adult	Established 1970 Nonprofit Continuum of programming throughout lifespan (educational, vocational,	The program follows an applied behavior analysis model, and therefore, applies many intervention methods that have

(continued0)

Table 2.2 (continued)

Type of program/ theoretical model	Age range	Description	Comments on evidence base
		residential) Activity Schedules; script and script fading	demonstrated effectiveness No comprehensive or systematic scientific evaluation of the program has been published. Outcomes focus on individual student progress and school placement The program has multiple elements which are well specified including student assessment protocol, parent and staff development, standardized curriculum, and student evaluation protocol
Douglass Developmental Disabilities Center- Rutgers, State University of New Jersey (Behavioral) Website: http:// dddc.rutgers.edu/	Birth through adult	Established 1972 Continuum of programming throughout lifespan Developmentally sequenced curriculum, applied behavior analysis instructional methods Specialized preschool class (staged progression along LRE continuum) Research and training	Specific methods used within the model (e.g., discrete trial teaching, incidental teaching, functional communication training) have evidence to support their use However, no comprehensive or systematic scientific evaluation of the program has been published. Outcomes focus on individual student progress and school placement The program has multiple elements which are well specified including student assessment

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Table 2.2 (continued)

Type of program/ theoretical model	Age range	Description	Comments on evidence base
			protocol, student curriculum, parent and staff development, and student evaluation protocol
Learning Experience, an Alternative Program for Preschoolers and their Parents (LEAP)-University of Colorado (combination) Website: http://depts.washington.edu/pdacent/sites/ucd.html	Early childhood	Established 1982 University of Pittsburg then relocate to University of Colorado-School of Education Preschool classes, parent training Inclusion model, peer-mediated social skills training	Several studies have demonstrated the efficacy of peer-mediated intervention, a major component of this program The program has multiple elements which are well specified including student assessment protocol, student curriculum, parent and staff development, and student evaluation protocol
<i>School-based programs</i>			
Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH)-University of North Carolina-Chapel Hill (Combination) Website: http://www.teacch.com/	Birth through adult	Established 1972 Department of Psychiatry Statewide program model-autism regional centers Self-contained classrooms in public schools and consultation and training to schools and developmental agencies Continuum of programming throughout lifespan (educational, vocational, and residential) Structured teaching: visual supports; predictability and physical structure Applied behavior analysis, incidental	Several studies have demonstrated that the structured teaching approach has demonstrated efficacy as applied in home-based settings. No studies have yet examined its use in the classroom setting Outcomes focus on individual student progress, long term follow up, and school placement The program contains elements which are well specified including student assessment protocol, parent and staff development, standardized

(continued0)

Table 2.2 (continued)

Type of program/ theoretical model	Age range	Description	Comments on evidence base
		teaching, alternative communication training Parent-professional collaboration, life- span focus	curriculum, structured learning environments, and student evaluation protocol
Denver Model- University of Colorado (Combination) Website: http:// www.jfkpartners. org/Content/PDF/ 39982-Parent% 20guideline%20-% 20DM.pdf	Early childhood	Established 1981 Emphasizes social- emotional development in young children Uses combination of behavioral techniques and structure teaching within a developmental framework Provides educational consultation in public schools	Several studies have examined the efficacy of this intervention program which showed significant developmental changes in cognitive, social- emotional, perceptual-motor, symbolic play, and social relatedness The program contains elements which are well specified including student assessment protocol, parent and staff development, standardized curriculum, and student evaluation protocol

methodological rigor in terms of controlling for variability in setting and integrity of intervention. Moreover, individual interventions often represent the main elements of the comprehensive program models (e.g., discrete trial teaching, incidental teaching, structured teaching, activity schedules) and evaluation allows the program administrator to assess the impact of intervention(s) on student outcome(s).

While a thorough description of the various and specific methods for each core and related feature is beyond the scope of this chapter, Table 2.3 provides information on the most commonly applied methods of intervention for core and related features associated with ASD. Strength of evidence varies among these methods, but references are provided at the end of the chapter that can assist readers with accessing either the original source or most current review paper, which can be used to guide selection of specific interventions when designing individual student programs or larger program models in a specific school or district.

Table 2.3 Common instructional methods for core and related features of ASD

Feature	Instructional methods
Core	
Socialization and play	Direct instruction social skills training; social scripts and script fading ^a ; Social Stories™ (Gray, 2000); peer mediation ^a
Language and communication	Discrete trial teaching ^a ; verbal behavior training ^a ; pivotal response training (PRT); incidental teaching methods ^a ; Picture Exchange Communication System [©] (PECS; Frost & Bondy, 1994); functional communication training ^a
Repetitive and stereotyped behavior patterns/interests	Functional behavioral assessment ^a ; stimulus control techniques; antecedent strategies; differential reinforcement procedures ^a ; response prevention
Related	
Prosocial behavior	Positive behavior supports ^a ; functional behavioral assessment and behavior support plan; self-management; social problem-solving; prompting methods ^a ; coping skills training; antecedent strategies; differential reinforcement procedures ^a ; activity schedules ^a
Adaptive and classroom participation	Direct instruction; positive behavior supports ^a ; visual supports; structured teaching ^a ; tasks analysis and task lists; shaping and chaining procedures; self-management; activity schedules; task interspersal; prompting methods ^a
Academics	Discrete trial teaching ^a ; direct instruction math/reading; peer tutoring; structured teaching ^a ; graphic organizers; differentiated instruction; modified general education curriculum; parallel curriculum
Mental health	Cognitive-behavior therapy; behavior therapy; problem-solving; parent education; psychopharmacology

Note: many methods listed are considered evidence-based, but may not yet have well-established evidence in ASD treatment

^aDenotes an evidenced-based method for ASD

Multiple methods have been described to treat the social interaction difficulties of students with ASD, some with more supporting evidence than others. Methods include direct instruction (e.g., Tse, Strulovitch, Tagalakakis, Meng, & Fombonne, 2007), social stories™ (e.g., Sansosti & Powell-Smith, 2006), peer modeling (e.g., Strain, Shores, & Timm, 1977; Odom et al., 1999), video modeling (e.g., Charlop & Milstein, 1989), and social scripting (e.g., Stevenson, Krantz, & McClannahan, 2000). Direct instruction, peer modeling, and social scripting currently demonstrate the strongest empirical base compared to the other methods listed.

There is also a variety of methods identified in the literature to treat the language deficits in ASD. These include discrete trial teaching (e.g., Lovaas, Berberich, Perloff, & Schaeffer, 1966; Young, Krantz, McClannahan, & Poulson, 1994), verbal behavior training (e.g., Sundberg & Partington, 1998), naturalistic methods such as incidental teaching (e.g., Koegel & Koegel, 1995), and augmentative or alternative systems such as the Picture Exchange Communication System[©] (PECS; Frost & Bondy, 1994). Most of these methods have some support as to their ability to increase speech production and communication in students with ASD.

Methods have also been identified to treat the repetitive and stereotyped behaviors seen in individuals with ASD. These interventions include behavioral assessment, various behavioral treatment methods (see Horner, Carr, Strain, Todd, & Reed, 2002; Matson, Benavidez, Compton, Paclawskyi, & Baglio, 1996 for reviews), and psychopharmacology interventions. Combined interventions (those that apply behavioral methods with medication) are often used for individuals with more significant behavioral challenges (see Bodfish, 2007 for a review). Less is known about effective treatments for many of the associated features of ASD such as sleep and feeding difficulties and psychiatric comorbidities (e.g., Hoffman et al., 2005; Matson & Nebel-Schwalm, 2007). There are also many interventions described in the literature that have minimal to no evidence to support their use (e.g., vitamin therapy, sensory integration, diets; see Smith & Wick, 2008 for a review).

Summary of the Evidence Base in ASD Intervention

Various claims have been made about the effectiveness of autism interventions, with and without evidence to support these claims. And, while there is consensus that early intervention improves outcomes for a large majority of young children with ASD (NRC, 2001), most of the research conducted has been on specific interventions, with few studies conducted on comprehensive programs. As a result, outcome data on the comprehensive programs are less robust than the well researched behaviorally based methods, which demonstrate the most empirical support with regard to specific interventions (Schreibman, 2000; Rogers, 1998).

In studies examining the effects of *comprehensive programs* on young students with ASD, evaluation has focused primarily on two variables: student outcome and school placement. Student outcome has been defined in terms of increases in intelligence and language, improvements in autism or other target symptoms (e.g., aggression, functional communication). School placement has been defined as the type of setting the student was placed in following participation in the treatment program (i.e., general education with/without special education supports, or special education settings). Smith et al. (2007) suggest that several of the comprehensive treatment models have support from initial *efficacy* studies. These include the UCLA model and the Denver model (Rogers, Hall, Osaki, Reaven, & Herbison, 2001) as well as intervention programs that emphasize incidental teaching (e.g., Koegel & Koegel, 1995). However, the strength of the evidence seems to be derived from data collected on specific interventions used within the models (e.g., discrete trial teaching, pivotal response training) and not from systematic evaluation of the various programmatic elements. For example, no studies were identified that reported on program level variables that may be related to student outcome (e.g., level of skill of instructors, amount of in-service training provided, integrity of data-based decision making process etc.). Moreover, few studies present data on treatment fidelity (evidence that the interventions were implemented as intended), which would strengthen the evidence of the relationship between treatment and outcome, or on contextual factors that may moderate intervention effects.

In *specific intervention* research studies, outcomes vary and typically address one specific behavior or skill of the student (e.g., increased eye gaze; increased sound production; decreased self-injury). Odom et al. (2003) completed a comprehensive literature review of evidenced-based practices for young children with autism, specifically reviewing the single-subject design literature base. These authors concluded that adult-directed teaching and differential reinforcement procedures are *well-established methods* of effective practice. *Emerging and effective practices* include peer-mediation methods, visual supports, self-monitoring, and family involvement. Practices that are considered *probably efficacious* include positive behavior support, videotaped modeling, and student choice/preference embedded within learning tasks.

Despite the findings reported above, much more work is needed to identify a broader set of effective treatments. For example, to date, no systematic research has compared one comprehensive program model to another. Smith et al. (2007) suggest that in order to move toward the next level of scientific evaluation of their effectiveness, these programs need to develop treatment manuals that can be pilot tested across multiple sites by independent evaluators. Further, studies are needed to examine comprehensive treatment programs for school-aged children and the cost-benefit or cost-effectiveness of programs and interventions. Few studies have examined factors associated with successful implementation of a program model or a specific intervention. Additionally, none of the literature reviewed provided data derived from field-based studies that systematically examined contextual factors, such as school culture, personnel or student characteristics, or fiscal resources that may moderate outcome associated with participation in comprehensive programs or application of specific interventions. Nor did the literature reviewed speak to how practical it is to implement the programs or interventions as described, in the field. In fact, very little is known about how to translate the comprehensive program models and interventions to the field successfully.

So what information do school personnel need to have to guide them in their decision-making about ASD program development options? First, school personnel are compelled by federal and state education mandates to identify what works or may work (i.e., evidenced-based). Second, they need to understand how to interpret findings from research studies and translate that information into practice within their specific school settings. Third, they need to evaluate these practices to ensure continuous fit within their specific school context and ensure long-term sustainability of the program model. With these points in mind, I next discuss some considerations for evaluating autism intervention practices.

Evaluating the Evidence of Effective Practice in ASD Intervention

In order to translate research derived methods into practice, school personnel first need to learn how to make determinations about what constitutes effective ASD intervention. By developing a working knowledge of research methodology and

criteria for evaluating the strength of evidence, personnel can critically examine ASD research in terms of identifying the types of interventions evaluated, the methods used to evaluate the interventions, the findings derived from the research, and the unanswered questions that remain.

Standards for evaluating scientific evidence exist. For example, the U.S. Department of Education, Institute for Educational Sciences published a guide on identifying and implementing education practices that are supported by research (U.S. Department of Education, 2003). This guide defines effective scientific-based practice in terms of interventions (i.e., educational practice, strategy, curriculum, or program) derived from *well-designed and implemented randomized controlled field trials* (i.e., effectiveness) indicating the “gold standard” for effective practice.

Alternative models have also been proposed that expand the definition of effective scientific-based practice to include various levels of strength of the evidence, which has more applicability to those areas of clinical research that are in their formative stages of development such as autism treatment. For example, Chorpita et al. (2002) proposed an evaluation system based on work originating from the American Psychological Association’s recommendations for measuring the quality of psychosocial interventions. The goal here was to provide guidelines for determining which interventions may be most appropriate for which childhood disorders. Chorpita et al. defined the quality of an intervention based on two dimensions. One, its *efficacy*, or how well the intervention changed the target behavior in a *research setting*. And, two, its *effectiveness* or how well the intervention changed the target behavior in the *field*. By considering the additional dimension of efficacy school personnel have more latitude in selecting interventions that demonstrate *some evidence in some settings, for some children* with ASD, an option that may be more viable given the wide variability seen within this disorder and the limitations of the current evidence base in ASD intervention. Once an intervention is selected for a particular student and applied, it can be evaluated for its impact on the target behavior. Recently, Reichow, Volkmar, and Cicchetti (2008) proposed a similar model for evaluating and determining evidenced-based practices specific to autism spectrum disorders.

Chorpita et al. (2002) proposed five-levels within the evaluation system. Levels differ mainly in terms of the methodological rigor of the study and the number and type of studies reviewed. Level 1 interventions are considered “*well established*” because they meet a more rigorous standard of evidence of their *efficacy*. Levels 2 and 3 interventions are considered “*probably efficacious*” and “*possibly efficacious*” respectively because they meet some of the rigorous standard of evidence, but fall short in a particular area or areas based on methodological weakness. Level 4 is described as “*unsupported*,” while level 5 specifies “*possibly harmful*” because at least one study has demonstrated harmful effects (Chorpita et al., 2002, p. 169). (See the TIP box for links to national resources on ASD treatment information.) Figure 2.1 provides a tool that can be used to assist you in critically examining the methods and findings of a particular study.

Tip Box

Web site for NIMH (<http://www.nimh.nih.gov/health/topics/autism-spectrum-disorders-pervasive-developmental-disorders/index.shtml>)

What Works Clearing house (<http://ies.ed.gov/ncee/wwc/>)

National Standards Project: <http://www.nationalautismcenter.org/pdf/NAC%20Standards%20Report.pdf>

Key words for extended literature searches (Autism treatment; Autism intervention)

ASD journals (Journal of Autism and Developmental Disabilities; Focus on Autism and Other Development Disorders; Autism)

Elements of Effective Practice in ASD Intervention

In an attempt to identify effective practices from the myriad of published reports in the treatment of ASD, the National Research Council of the National Academy of Sciences (NRC, 2001) conducted a systematic review of the published literature on the educational practices for children 8 years and younger. According to the NRC and other reviews noted above, several elements are considered essential to the development of high quality educational programs for young students with ASD. While these elements of effective practice were described for younger children, Iovannone et al. (2003) suggested they could also be applied to older students as well. They include

- Highly supportive and structured instructional environments
- Comprehensive developmentally sequenced curriculum, with an emphasis on core deficit areas
- Assessment data linked to intervention
- Behavior supports based on functional behavioral assessments
- Specific strategies for generalization and maintenance of skills
- Carefully planned transitions across grade continuum settings
- Low student-to-staff ratios
- Comprehensive personnel preparation
- Highly skilled personnel
- Personnel supervision
- Program review mechanisms
- Family-school collaboration

Thus, despite the need for more methodologically rigorous research in ASD treatment (Smith et al., 2007) there is a sufficient research-base to identify some of the basic elements that need to be applied in the formation of an ASD program. These elements, combined with evidence-based practices in education and program evaluation yielded the *ASD Program Development and Evaluation Protocol* (Magyar, 2006) described next.

Is this research study of a comprehensive educational program model (CEPM) or specific instructional method (SIM)? (if neither, is it a description of a model program only?)

If CEPM:

What theoretical framework is being applied in this model?

What are the elements of the model? Is there a manual?

What specific features/behaviors of ASD are addressed by this model?

What specific aspects of the instructional context are addressed by this model?

What method or methods did the authors use to evaluate the impact the model had on student features/behavior?

Were the methods well described?

Were there data collected on the fidelity of the methods across participants, instructors, and conditions?

Was there mention of a comparison group or control group?

How were students selected to participate? Were they randomly assigned to treatment groups?

Was this study a replication of another study?

What was the age range of the students that participated in this model?

What was the ability level of the students that participated in this model?

Where was the model implemented?

If SIM:

What specific features/behaviors of ASD are addressed by this intervention?

Is the intervention well described? Did they use a treatment manual?

Were there data collected on the fidelity of the methods across participants, instructors, and conditions?

Do you think this intervention could be 'replicated' in the classroom?

Is there description of the instructional context that the intervention occurred in?

What method or methods did the authors use to evaluate the impact this intervention had on student features/behavior?

Case study?

Single-Subject Design? What was the specific design?

Group Design? What was the specific design?

Were the methods well described?

Was there mention of a comparison group or control group?

How were students selected to participate? Were they randomly assigned to treatment groups?

What was the age range of the students that received the intervention?

What was the ability level of the students that received the intervention?

Where was the intervention implemented?

Do you think the model or method described in this study will fit within your school context? If no, what would need to change within the context to make it fit?

Fig. 2.1 Worksheet for determining relative strength of evidence of Program model or instructional method

The ASD Program Development and Evaluation Protocol

Description of the Protocol

The *ASD Program Development and Evaluation Protocol* (Magyar, 2006; hereto referred to as the ASD Protocol) specifies an integrated multi-component program development procedure that provides a framework to assist school personnel in designing an ASD program that contains evidence-based program elements and can be developed and implemented within their specific school context. The conceptual model underlying the ASD Protocol was informed by the research literatures in developmental and school psychology, education, program evaluation, and applied behavior analysis. Selection of the specific methods and approaches derived from each of these empirical domains and included in the ASD Protocol was predicated on the principle that student learning and achievement is functionally related to student characteristics and the quality of the instructional context. Therefore, by combining selected evidence-based methods into the ASD Protocol, the author was able to define an ASD program model and standardize a program development process to assist schools in developing their own ASD program. This concept is illustrated in Fig. 2.2.

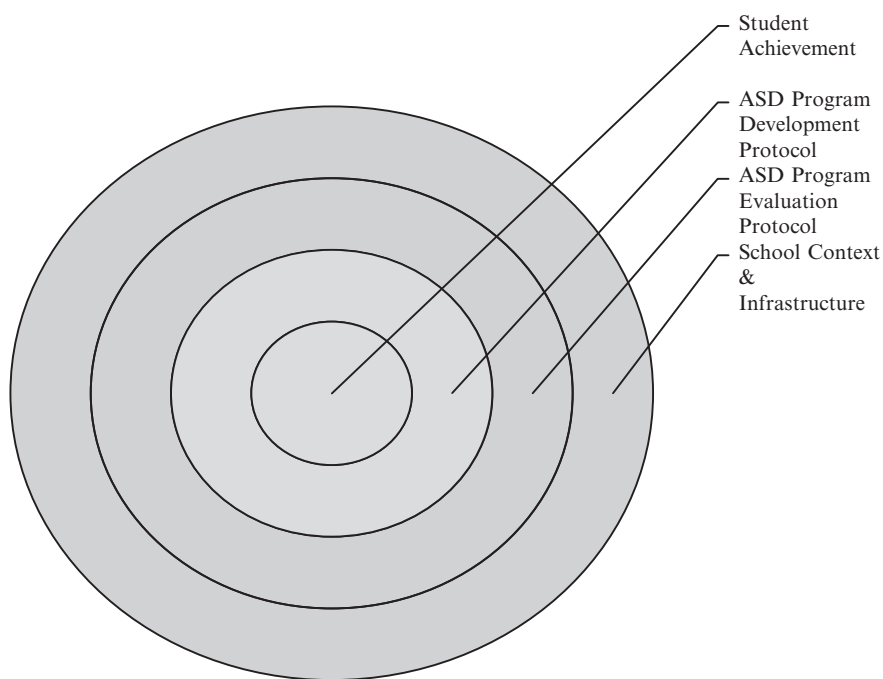


Fig. 2.2 Relationship between student achievement, ASD program, and school context

The objectives of the ASD Protocol, therefore, is to assist school personnel in developing an ASD educational program that meet the needs of the students and demonstrates evidence of effective practice in order to improve student achievement. These objectives are consistent with the federal mandates of IDEA and its provision of a Free and Appropriate Public Education (FAPE) and the emphasis on student achievement in No Child Left Behind (NCLB). Each of these objectives is described below.

Objective 1: ASD Program Model: Appropriate Educational and Behavioral Support for Students with ASD

As discussed in Chap. 1, students with ASD can present significant educational program planning challenges because of their complex neurodevelopmental and co-occurring impairments and disorders. This complexity of need makes educational programming challenging, particularly at a systems level (i.e., program level). Data are needed to describe student needs and to inform program planning. The ASD Protocol enables school personnel to describe student educational needs (group and individual levels) and the school context (system and classroom levels), which informs their ASD program activities. The ASD protocol provides a standardized procedure for developing a program that contains elements of effective practice and is designed to meet the needs of the students with ASD.

Objective 2: Improve Student Achievement

Student achievement is related to the quality of the instructional context and needs to be defined and measured in terms of academic performance, and improvements in social communication and personal and social self-sufficiency. These areas represent core deficits and have been related to less than expected academic performance, more restrictive educational placements, and poorer post-secondary outcomes (see Howlin, 2005 for a review of outcomes in ASD). The functional role of the instructional context in student achievement is emphasized in NCLB and at the core of the ASD Program Model described in this book. ASD programs designed for students with ASD must demonstrate elements of quality instruction that include the evidence of positive behavior supports, use of evidence-based instructional methods, high levels of student engagement, frequent student response opportunities, and curriculums and interventions that address the remediation of core and related deficits. Creating quality and effective learning environments requires trained personnel. Therefore, programs designed for students with ASD must include a component specific to staff training that focuses on teaching personnel to establish effective instructional contexts and to engage in evidence-based practices.

To accomplish these objectives, the ASD Protocol specifies five core components that define the ASD Program Model and its procedures. These include

- Program evaluation protocol
- Classroom development system
- Staff training model
- Model for student support teams
- Model for family-school collaboration

Each of these research-derived components is introduced briefly below and described fully in subsequent chapters.

ASD Program Model: Components Described

ASD Program Evaluation Protocol

Program evaluation is central to the *ASD Program Development and Evaluation Protocol*. A standardized program evaluation procedure is defined that enables school personnel to collect data on student programming needs, elements of the school program, and evidence of evidence-based practices in ASD education. Various methods and measures are used to gather these data and are analyzed to inform ASD program development and/or improvement activities. Collaborative planning and problem-solving procedures are used to support data-based decision making. Chapters 4 and 11 describe the ASD Program Evaluation Protocol and its primary applications.

ASD Classroom Development System

The ASD Classroom Development System provides a structured approach to developing a classroom or inclusion program that contains elements of effective practice. This system includes specification of the design elements of the instructional context and includes identification of the environmental supports necessary to students with ASD, formalized positive behavior support system, considerations in ASD specific curriculums, identification and specification of evidence-based instructional methods, and a student evaluation system. The ASD Classroom Development System is described in Chaps. 7 and 8, which include a variety of planning tools to assist in developing a classroom or inclusion program that meets student educational and behavior support needs.

ASD Staff Training Model

The ASD Program also specifies a model of professional development that supports the development of ASD classrooms and/or inclusion programs and the use of

evidence-based practices by educational personnel. The ASD Staff Training Model, described in Chap. 6, specifies the components of the training model and provides information on content of the training curriculum, format and methods of training, and the planning and evaluation measures to evaluate outcomes and identify on-going training needs.

ASD Student Support Team: Collaborative Planning and Problem Solving

Collaborative planning and problem solving are essential to student achievement and therefore an integral part of the ASD Program. A collaborative student support team approach is applied to school-wide as well as specific classroom/inclusion program development. The ASD Protocol specifies a model for establishing collaborative teams for purposes of program planning and problem-solving, which forms the foundation of the team process. Chapter 9 describes the student support teams and the collaborative planning and problem solving process. It provides tools to assist with implementing this component of the ASD Program.

ASD Family-School Collaborative Model

Parents are an integral part of their child's education and achievement. The ASD Program emphasizes the importance of parental involvement and specifies a model of family-school collaboration that includes parents as partners in planning and problem solving for their child's educational program. Moreover, the ASD Family-School Collaborative Model includes educational opportunities for parents to increase their knowledge about their role in educational program planning, and community services that may be needed to support their child at home and in the community. Chapter 10 provides a description of the model and provides tools that can assist with implementing this component of the ASD Program.

Considerations in Applying the ASD Program Development and Evaluation Protocol

The ASD Protocol specifies how these components can be translated into practice in your district. The ASD Protocol takes a systems-level perspective of program development to ensure that the ASD program you design meets the identified needs of the students at the individual, classroom, building and/or district-wide level, and can be implemented as described and sustained over time. This systems-level

perspective ensures that the ASD program becomes a part of the school system and not a separate program that has little chance of sustaining because its mission and operations are not supported by the policies and procedures of the larger school context (Ringeisen, Henderson, & Hoagwood, 2003). Moreover, by embedding evidence-based methods into the daily instructional practices of school personnel (Gersten & Brengelman, 1996) the more clearly the link between teacher practice and student achievement is demonstrated and therefore, the more likely the ASD Program will be implemented and maintained over time (Gersten & Woodward, 1992). A program that is designed to “fit” within the school system, across multiple levels (i.e., student, classroom, building, district, and community) is more likely to be implemented with good integrity, and can be systematically studied to determine its effect on student achievement. The ASD Program Evaluation Protocol provides the mechanism for ensuring the components of the ASD Program are implemented and operational.

Embarking on any program development initiative requires careful planning, involving multiple stakeholders. This is particularly so for ASD programs because of the costs associated with the type and scope of services needed. Therefore, prior to embarking on ASD specific program development, school personnel must have a clear understanding of the needs of the students with ASD and the district or school context. A thorough understanding of these two interrelated components will assist in the design of an ASD program that meets the needs of the students, contains elements of effective practice, and fits with the school’s context and daily operations. To assist with this evaluation, the ASD Protocol describes a program evaluation protocol that enables you to evaluate the needs of your students and describe your existing school program infrastructure. Chapter 3 describes the evaluation practices that informed the development of the ASD Program Evaluation Protocol and Section II is devoted to describing the components of the ASD Program Model and the procedures for designing a program model that fits your program development needs.

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