School-Age Education Programs for Children with Autism

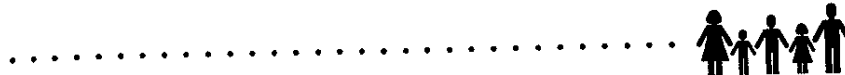Edited by

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Behavior Analysis and Intervention for School-Age Children at the Princeton Child Development Institute

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The Princeton Child Development Institute (PCDI), a nonprofit organization, was founded in 1970 by the grandmother and mother of a young boy with autism. When they were unable to locate appropriate, noninstitutional services in New Jersey, they launched a national search that culminated in the selection of a science-based intervention model: applied behavior analysis. PCDI was the first community-based school program in the state that was specifically designed to provide intervention for children with autism.

Students are referred by their local school districts, and tuition is paid by those districts. Tuition covers approximately 84% of educational costs. It does not cover transition services for youngsters who are preparing to enter community settings or follow-up services for those who have already done so. Some school districts agree to pay tuition for children who are participating in a program of gradual transition from PCDI to their local schools, but such payments are not mandatory. Some parents pay PCDI for follow-up services, but because of the importance of these services, they are delivered regardless of ability to pay. Services and programs that are not funded by tuition payments are underwritten by grant-writing and fund-raising activities.

The Institute's mission is to provide effective, science-based education and treatment, to prepare young professionals for leadership roles, and to conduct research on intervention. Research findings are disseminated via journal articles, books, book chapters, and videotapes and are also immediately put into practice to benefit currently enrolled and future students.

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The School

In the early years, the Institute occupied leased facilities in churches and then a building no longer used by a local school district. But 1983 marked the beginning of a capital campaign to purchase land and construct a new building at 300 Cold Soil Road in Princeton. The new quarters were especially designed to meet the education and intervention needs of children with autism and to facilitate professional training and research. Members of the board of trustees actively solicited potential donors, enlisted the support of community leaders, and conducted fund-raising activities. In addition, grants were received from The Kresge Foundation, the New Jersey Department of Human Services, and many local foundations. The new building was dedicated in 1985; all necessary funds were raised, and neither long- nor short-term financing was necessary.

In 1994, a second building campaign was inaugurated. This fund-raising endeavor targeted $2.5 million for the addition of approximately 13,000 square feet, more than doubling the existing space. One hundred percent of parents, staff members, and trustees supported the campaign, and many pledges from individual and corporate donors were supplemented by a major grant from The Kresge Foundation, as well as grants from other foundations.

The new facilities were completed in 1997, again with no outstanding debt, and won an architectural award. Architects and intervention professionals often visit the Institute, and the facilities have provided a model for other programs in New Jersey and elsewhere.

All instructional areas of the school are carpeted; this helps to create a quiet environment that promotes ongoing language instruction. Wide hallways not only invite children to use the halls as play areas but also enable groups of visitors to comfortably tour the facilities. Most classrooms provide space for several instructors and students, so that senior teachers can model instructional procedures and assist novice staff members. Perhaps most important, the building is designed to permit easy observation of all areas occupied by students, enabling supervisors, parents, and visitors to view ongoing activities. Further, the offices of senior intervention personnel and program directors are not clustered together in one area but distributed throughout the school, so that supervisors are available to monitor ongoing activities and assist staff members.

Diagnosis and Assessment

Twenty-four of the 26 students who presently attend the Institute's school were previously served in the preschool, and 10 were first seen as toddlers enrolled in PCDI's early intervention program at 21 to 31 months of age. All of the children were diagnosed with an autism spectrum disorder; these diagnoses were conferred by physicians unaffiliated with PCDI. Institute psychologists confirmed the diagnoses, using the *Diagnostic and Statistical Manual of Mental Disorders–Fourth Edition* (American Psychiatric Association, 1994). IQ scores, verbal skills, and presenting repertoires are unrelated to admission criteria.

The progression from early intervention program to preschool to school is virtually seamless. Because school-age youngsters are already well known to Institute personnel, and because of the continuity of their intervention programs, new diagnostic initiatives are of minimal interest. At the request of parents or school district representatives, PCDI professionals conduct formal assessments. But the assessments of choice are the direct observation and measurement procedures that are part of the established practice of applied behavior analysis, such as frequency, rate, and duration measures and time-sampling procedures. Parents and professionals collaborate on the selection of education and intervention goals for each student, and target responses are regularly observed and measured, usually daily or two to three times per week. The resulting data are frequently reviewed, and ineffective programs are revised or replaced.

The Staff

At PCDI, staff members wear many hats. The Institute uses a generalist rather than a specialist model. There is no speech therapy department, occupational therapy department, recreation department, or music or art department. Instead, there is a school program staffed by professionals who use applied behavior analysis technology to teach speech and language, academic skills, daily living skills, leisure pursuits, family and community participation, and other critical repertoires.

Most staff members arrive with a bachelor's or master's degree in education or psychology but with minimal or no academic background

or experience with applied behavior analysis or developmental disabilities. Although preservice and in-service workshops are provided, the most important training is hands-on: A trainer–supervisor (also known as a consultant or mentor) accompanies a new staff member to each assignment, models intervention procedures, structures supervised practice opportunities, gives positive and corrective feedback, and offers continuing support. This intensive, in vivo professional preparation is made possible by a trainer–trainee ratio of 1:4. Although it is an expensive ratio, we have not discovered another means to help staffers achieve the sophisticated intervention repertoires that are so important to young people with autism. Major investments in training are essential because, in truth, an intervention program is only as good as staff members' skills.

Year after year, PCDI generates data that make strong statements about training effects. First, the data show that although didactic training changes paper-and-pencil responses, it does not enable most people to achieve criterion intervention performances. Second, the data show that given regular, ongoing, hands-on training, it takes most new staff members 6 to 12 months to acquire basic intervention repertoires.

Each year, after instructors have received 3 or 4 months of hands-on training, they have "practice" evaluations conducted by their primary trainers, who use a protocol developed at the Institute. Then training continues and after 6 to 9 months, a senior professional who is not the staff member's primary mentor conducts an annual performance evaluation. The evaluation protocol is identical to the training protocol—the skills that are evaluated are precisely those skills that are taught. Staff members are successful if they exhibit the repertoires that are the targets of training, *and* if observational data on the children they serve show positive behavior change. Their mentors are successful only if the trainees pass their evaluations *and* the data on child performance show desired behavior change; and school administrators experience success only when data document favorable outcomes for students, teachers, and the teachers' mentors (McClannahan & Krantz, 1993). These group contingencies (Speltz, Shimamura, & McReynolds, 1982) create an intervention system that supports children's progress, and it should be noted that the contingencies are real. There is no tenure system at PCDI; staff members who do not pass their annual evaluations are not reappointed for the following year. However, group reinforcement contingencies promote everyone's success, and most people pass their evaluations.

Program Administration

Baer, Wolf, and Risley (1987) discussed the weak contingencies available to behavior analysts who serve as external program consultants and concluded that it is important for scientists to become program administrators. We concur with that recommendation, but it is noteworthy that our field has done a much more credible job helping young professionals acquire intervention technology than teaching them to apply behavior analysis skills to financial management, public relations, marketing, working with governing boards, contract negotiation, or fund-raising. Some scientist–practitioners acquire these skills from the school of hard knocks, but that is a risky way to do business. Such risks sometimes result in financial disaster, loss of valuable colleagues to our field, failed programs, and adverse publicity for behavior analysis (Krantz, 2003). At PCDI, an important role of program administration is to provide a curriculum for tomorrow's leaders, one that prepares them to become the heads of new autism intervention programs.

Effective intervention programs require precise arrangements of antecedent and consequent variables to achieve desirable, interactive outcomes for service receivers, staff members, staff trainers, and managers. If the CEO is not a behavior analyst, it may be difficult to put relevant measurement systems in place, to introduce new intervention procedures, or to make organizational policy that is based on objective data. We teach the next generation of leaders that autism intervention is most effective when entire systems are designed, managed, and revised on the basis of data.

Administrators must recognize that the intervention business, like other businesses, must achieve an almost-balanced budget in order to survive, especially in an era of reduced expenditures for education and human services. But profit margins that are gained by grossly underpaying intervention personnel or by capriciously altering staff–learner ratios lead to ineffective programs, and sometimes even to the demise of agencies. Typically, the only "profits" that accountable agencies achieve are the result of intervention efforts that defer or preclude larger expenditures. Early intervention often achieves this type of cost effectiveness (Jacobson, Mullick, & Green, 1998); when children make transitions from intensive behavioral treatment to public school classrooms, multimillion-dollar expenditures for long-term treatment are obviated. Similarly, when adolescents acquire skills that later contribute to their success in supported

employment, cost savings are achieved through their income tax payments, their reduced or nonexistent SSI and Medicaid benefits, and their contributions to the costs of their training programs.

Although some people with severe developmental disabilities need lifelong services, effective intervention that produces socially significant behavior change can nevertheless result in substantial savings. For example, teaching relevant family- and community-living skills may prevent residential placement, and reduction in the frequency of self-injury or aggression may permit children to continue their intervention programs with less expensive staff–student ratios.

At PCDI, some additional savings are realized because administrative costs (e.g., secretarial, bookkeeping, and business management costs) are distributed across the early intervention program, the preschool and school, the residential programs, and the adult program. This keeps the administrative team very busy, but we have often noted a relationship between a "lean" administration and additional dollars earmarked for intervention.

The Students

At this writing, all 26 students who attend PCDI's school are male; 2 are Asian, and the remainder are Caucasian. They range in age from 5 to 21 years, and they have been enrolled in the Institute's programs for 3 to 18 years. At program entry, none was toilet trained. Most had little or no receptive or expressive language, and they engaged in high-rate stereotypies such as vocal noise, hand-flapping, toe-walking, and other repetitive responses. None of them imitated others or engaged in cooperative play with siblings or peers; none appropriately interacted with caregivers; and none displayed normative visual attending to family members or others. Some were self-injurious, and many engaged in frequent crying episodes or tantrums. Presently, one student lives in a PCDI group home; the others live at home with one or both parents.

Children attend school from 8:30 A.M. to 2:30 P.M., 5 days per week. The overall instructor–student ratio is 1:1.2, but the teacher–learner ratio for the youngest children is 1:1; it gradually changes as students gain skills, so that the ratio for adolescents is 1:2.

Although some writers report that approximately 50% of children with autism do not learn to talk (Spradlin & Brady, 1999), that has not been our experience. The spoken language of currently enrolled students

ranges from a few words to *paragraphic* speech (i.e., unprompted verbal productions that include two or more sentences or questions). Presently, 15 children display paragraphic speech. Three students use augmentative communication devices but continue to receive expressive language training.

All of the children use activity schedules throughout the school day (McClannahan & Krantz, 1999), and 17 use written rather than photographic activity schedules. Reading levels range from prekindergarten to fourth grade.

Curriculum and Instructional Methodology

The curriculum is a series of intervention programs developed at the Institute during the last 3 decades. An intervention program is defined as a document that includes, at minimum, (a) a written response definition that describes observable behavior or products of behavior, (b) a specified measurement procedure, and (c) a written description of the teaching procedures. At last count, there were 794 such programs that addressed the following skill areas: arithmetic, art, activity schedules, community living, correspondence and matching skills, direction following, engagement or on-task behavior, expressive language, handwriting, health care, home living, keyboard skills, leisure activities, money, motor imitation, music, physical education, peer interaction, reading, receptive language, science, self-care, social skills, social studies, spelling, time, verbal imitation, and vocational skills.

At the outset of intervention, toddlers' and preschoolers' programs typically include visual attending, matching and picture—object correspondence skills, following photographic activity schedules, following directions, motor imitation, verbal imitation, receptive labeling, social initiations, play skills, and appropriate use of the potty or toilet. Professionals and parents jointly participate in selecting an initial curriculum for a child, based on his or her presenting skills and skill deficits. The curriculum is individualized for each youngster; programs are added or deleted, based on the child's repertoire. For example, one child's instructional plan may include a program that teaches eating a variety of foods and a program that teaches riding a tricycle; another youngster's curriculum may feature fine motor skills such as coloring or using a computer mouse and dressing or undressing.

As children acquire new skills, some programs are discontinued and others are added. The selection of new programs continues to be based on data on the student's current skills. Matching skills are prerequisites for learning picture–object correspondence; imitating phonemes is a necessary prerequisite for learning to imitate longer utterances.

Not only is curriculum content individualized, but teaching procedures are also individualized for each youngster. The manner in which instructional stimuli are presented, prompting and error correction procedures, and types of rewards are tailored to each child's existing skills and learning style. Of course, children learn at different rates, have unique preferences, and display faster progress in some areas and slower progress in others. As a result, when they make the transition from preschool to school, each child's curriculum may be quite different from his peers'.

Programs may be implemented at school, in children's homes, and in community settings. Many programs begin at school, and when the relevant skills are mastered in that setting, generalization is programmed to home. For example, a student may learn to read, take pills, make a bed, or make a sandwich at school, but when the goals are met in that setting, the program is introduced at home; this accelerates young people's progress and promotes parents' success in delivering instruction and intervention at home.

Other programs begin at school and are later implemented in the community. It is important to teach youngsters to behave appropriately in barber shops and in dentists', pediatricians', and optometrists' offices but impractical to teach all of the requisite skills in those settings; therefore, relevant events are first simulated at school, and basic repertoires are established before the children visit such shops and offices. Likewise, youngsters may initially practice making purchases in the classroom "store," and when that skill set is acquired, they next practice making purchases at fast-food restaurants, ice cream parlors, convenience stores, grocery stores, and other establishments. Many skills require community programming; for example, most schools do not offer the variety of toilets, stalls, urinals, faucets, hand dryers, and paper towel dispensers that are necessary to program generalized use of public restrooms.

The PCDI curriculum does not feature one or a few intervention procedures; rather, it includes a plethora of empirically based procedures that are represented in the research literature of behavior analysis. Young people with autism, like all of us, must learn to learn in a variety of ways; from discrete trial teaching and incidental teaching; from stimulus shaping and fading procedures; from pictorial, auditory, and textual cues; from

television, videotapes, and computers; and from parents, teachers, peers, and employers (Krantz, 2000).

Integration

When students develop the requisite skills, it is important to program social interaction opportunities with siblings, peers, and community members. For example, young PCDI students learn to play board games, engage in exercise routines, and participate in sports such as swimming, biking, skiing, and skating with their brothers and sisters.

Based on the data on students' skills, staff members help arrange interaction opportunities with peers without disabilities. When attending "play dates," gymnastics lessons, after-school programs, day camps, and religious education classes, children are initially accompanied by staff members, whose presence is gradually faded when data show that youngsters are displaying appropriate social repertoires. Special programs also help young people participate in family and community events such as birthdays, weddings, funerals, bar and bat mitzvahs, confirmation ceremonies, church choirs, holiday celebrations, and local sports events.

In addition, when children meet certain readiness criteria, they begin gradual transitions from PCDI to general or special education classrooms in their local communities. Variables that appear to be predictors of children's success in public school classrooms include displaying sustained engagement with teacher-directed activities and class assignments, consistently following individual and group directions, responding to temporally delayed consequences delivered via behavioral contracts or school notes, using novel or generative language, displaying skill generalization across settings, and exhibiting low rates of inappropriate behavior such as stereotypy or tantrums (Krantz & McClannahan, 1999).

At this writing, two youngsters, ages 7 and 8 years, are making gradual transitions from PCDI to public schools. They are accompanied by Institute professionals whose presence is gradually faded, based on the data on children's performance in the receiving classrooms.

Although some people need lifelong support, ever expanding community participation is actively programmed. Students of varying abilities learn to make grocery lists and do grocery shopping; use ATMs; place orders in restaurants; use recreation facilities such as tennis courts, driving ranges, and gyms; and use public laundromats. Presently, six young people, ages 18 to 21 years, participate in a work-study program designed

to smooth their transitions to adult employment. PCDI personnel accompany them to their part-time jobs and to after-work activities in the community.

When discussing integration, a cautionary note is in order. Although "social integration" is widely touted, it too often means that children with autism attend public school classrooms where they engage in parallel activities that only vaguely resemble those of their classmates and receive noncontingent attention and ineffective prompts from aides who have no training in behavioral intervention. This type of programming is very expensive because there is often no return on the dollars invested.

Integration is also irrelevant if children have not yet learned to visually attend to interaction partners, imitate others' behavior, or participate in nonverbal social exchanges such as showing or turn taking. When children are beginning to acquire social repertoires, adults are often better interaction partners than peers, because adults can provide clear models, control the pace of interaction, and pause and wait for children to respond. Donald M. Baer, a founder of applied behavior analysis, noted:

> The political value of keeping autistic children in mainstreamed society is not to their benefit if they're failing to learn the skills necessary for mainstreamed life in adulthood. If a relatively independent and happy life as an adult is our goal, then I think the literature, indirectly, but I think fairly consistently, supports the notion that you're going to have to have a fairly restrictive environment, a very closely structured program when the individual is younger. And in the long run that will turn out to be the least restrictive programming you could have had that will accomplish the desired outcome. (Heward & Wood, 2003, p. 299)

Transitions from Childhood to Adulthood

Expectations for typical children change radically when they cease to be preschoolers and attain school age, and expectations continue to change as they move from elementary school to middle school to secondary school. It is the same for young people with autism. Parents, siblings, relatives, neighbors, and community members have increased performance expectations as children with autism get older. If programming emphases do

not change to reflect changes in expectations, students with disabilities are vulnerable to public disapproval and discrimination.

As a case in point, after preschoolers learn to use words and phrases, we teach "please" and "thank you," and when they arrive at school age, we begin to teach other polite responses, such as "no, thank you," "you're welcome," and "excuse me." Not long after that, we teach them to introduce themselves, to give and accept compliments, and to offer assistance to others. A repertoire of "please" and "thank you" may be adequate for a preschooler, but it is an impoverished repertoire for a 10-year-old or an adolescent with autism.

Likewise, we are happy if preschoolers independently wash their hands and follow parents' directions at bath time, but elementary-age youngsters must learn to bathe or shower with less assistance, and teenagers must acquire self-care repertoires that include acne prevention, shaving, feminine hygiene, nail care, use of deodorant, and other grooming skills that are typical of adolescents and adults without disabilities. Each skill set serves as a foundation for the next accomplishments. Young children make simple snacks and set the table; later, they learn to make sandwiches and use the microwave; adolescents make their own breakfasts and lunches, and adults prepare complete meals. Smooth transitions from childhood to adulthood require that, at each age level, we identify the next repertoires that enable people to achieve optimum independence in adulthood.

Almost 20 years of experience providing services to adults with autism has a continuing impact on the curriculum for school-age children. Data on adults' skills and skill deficits often suggest skill areas that should be taught earlier, or repertoires that should be elaborated before students arrive at adulthood (McClannahan, MacDuff, & Krantz, 2002). Learning to wait is an example of a repertoire that must expand throughout childhood and adolescence. Preschoolers learn to wait for 1 or 2 minutes, long enough for a parent to pay a store clerk, put an infant in a car seat, or turn off the bathwater. Elementary-age children wait for somewhat longer intervals while parents answer the telephone or the door, put a casserole in the oven, or listen to a sibling's account of the school day. Teenagers learn to wait in designated locations at shopping malls, restaurants, or other community settings, because it is no longer appropriate for them to go into public restrooms with parents of the opposite gender. Before they enter supported employment programs, adolescents and young adults must be capable of waiting for more extended periods of time when parents, instructors, job coaches, or employers are out of sight.

Family Participation

Parents are welcomed to PCDI for school visits, and a home programmer (a member of the professional staff who has daily contact with a student) regularly visits the home. After parents give consent for a new intervention program, the program begins at school, and the parents are invited to observe, to collect data on their child's performance, and, later, to implement the program at school with the assistance of the home programmer. When the student acquires the target skills at school, the home programmer and parents introduce the program at home; and when the young person dependably displays those skills at home, the home programmer's assistance and presence are gradually faded from that activity, leaving the parents to maintain or extend it. These events represent a continuing cycle; when a boy or girl masters one skill set, a new program is initiated. During the past year, home programmers delivered 1,915 hours of home programming services (the equivalent of 48 forty-hour workweeks), made 1,049 visits to 25 families (a mean of 42 visits per family), and helped parents implement 198 intervention programs in their own homes.

Parents' involvement with their children with autism appears to follow much the same pattern as their involvement with their sons and daughters without disabilities. That is, they expect to spend a great deal of time with toddlers, preschoolers, and young elementary-age children, but when children arrive at puberty, expectations often shift toward greater independence; and when children become adults, those expectations are further magnified.

PCDI professionals help parents select intervention goals that are consistent with their changing expectations. Upon returning home from school, a 9-year-old learns to remain independently engaged in leisure activities for longer time periods. A 10-year-old helps by unloading the dishwasher, setting the table, and folding towels. A 12-year-old completes homework assignments with minimal assistance. A young teenager independently follows an activity schedule to complete a workout that includes doing calisthenics and walking on a treadmill. An older adolescent independently arises when his alarm clock rings, makes his bed, showers, and shaves with minimal supervision. Other intervention programs help youths learn to take responsibility for their own belongings. Behavioral contracts help them arrive at school with completed homework assignments; school lunches they made the previous evening; wristwatches (important for time-telling and appointment-keeping skills); wallets (necessary for acquisition of purchasing repertoires); gym bags; and notes from

parents that verify that they completed a home activity schedule, prepared a target food, practiced piano, or vacuumed and dusted a room. Learning to respond to delayed contingencies—for example, responding to positive or corrective feedback delivered at school for behavior at home on the preceding day—promotes independent performances that are valued by parents and that also expand students' opportunities to hold jobs and to participate in community activities.

Outcome

Approximately 42% of children who arrive at PCDI before 60 months of age later make successful transitions to public schools, and the majority of them participate in general education rather than special education. Some have completed college and are now pursuing careers; some finished high school and found jobs in business and industry; and some are attending elementary schools, middle schools, and high schools in their own school districts and neighborhoods. The outcomes and accomplishments of some of these young people are described in greater detail in McClannahan and Krantz (2001).

The data on outcome have remained quite stable for more than a decade, and because about 58% of enrolled children will need lifelong services, there is no defined age for program exit. Useful data are derived from providing a continuum of services for toddlers, preschoolers, school-age children, and adults with autism. As noted earlier, data on intervention for young children often enhance outcomes for tomorrow's adults, and data on adults' skills and skill deficits suggest improvements in the curriculum for young children (McClannahan et al., 2002).

Special measures are needed to assess outcomes for students who remain at PCDI; therefore, once a year, an outside evaluator—a professional with expertise in autism intervention—reviews as many programs as possible during a 3-day visit to PCDI, using a protocol that was developed and validated at the Institute. During the past year, 723 behavior-increase programs, 198 home programs, and 44 behavior-decrease programs were delivered to 29 children—a total of 965 programs. Because of the large number of programs implemented during a 12-month period, it is impossible to review all of them; therefore, the evaluator is asked to devise a sampling procedure.

The evaluator scores a program as completely documented if it includes a written response definition, a specified measurement procedure,

a description of intervention procedures, and a graph or other form of data summary that displays the target responses over time. Programs are also scored as producing desired behavior change, producing no behavior change, or producing unfavorable behavior change. Further, evaluators are asked to determine whether a program is consistent with professional ethics and the published literature of the field. If the answer is affirmative, the program is rated "may continue"; programs that are not viewed as consistent with professional ethics or the literature of behavior analysis are scored "stop immediately"; and programs that are not fully documented are rated "can't ascertain."

The evaluator also notes the presence or absence of written parent consent, obtained within the prior 365 days or since the last program revision, and determines whether four or more interobserver agreement measures were obtained for that program during the past year. Of course, documentation of parents' or guardians' consent is important for reasons of rights protection and professional ethics. And assessment of interobserver agreement is relevant because decisions about intervention are only as good as the data upon which they are based. Table 6.1 displays the results of the most recent evaluation by an outside expert.

Table 6.1 shows that, on the last external evaluation of intervention programs, 100% of school behavior-increase programs, 98% of school behavior-decrease programs, and 99% of programs implemented at home by students' parents were scored as completely documented. Thus, most programs contained the information necessary to the assessment of students' progress.

The table also shows that 98% of school behavior-increase programs, 80% of school behavior-decrease programs, and 95% of home programs were scored as producing desired behavior change. The lowest score shown in Table 6.1 is the percentage of school behavior-decrease programs rated as producing desired behavior change. Behavior-decrease programs often address repertoires that are difficult to alter, such as vocal noise, motor stereotypy, noncontextual laughter, aggression, and self-injury. Typical intervention procedures include reinforcement of incompatible responses, token loss, behavioral rehearsal, and graduated guidance. For some years, we have examined "opt out" procedures—procedures that teach people to appropriately exempt themselves from settings and activities that evoke stereotypy, aggression, or self-injury—and the data indicate that students with severe disabilities and long histories of disruptive behavior can learn to appropriately excuse themselves, depart to the privacy of an unoccupied classroom at school or a bedroom at home, and return to ongoing

Table 6.1

Results of an Annual External Evaluation of Intervention Programs

Measure	School Behavior-Increase Program N = 66 of 723 (9%)	School Behavior-Decrease Program N = 44 of 44 (100%)	Home Program N = 198 of 198 (100%)
Programs scored as completely documented	100%	98%	99%
Programs scored as producing favorable behavior change	98%	80%	95%
Programs rated as appropriate (i.e., "may continue")	100%	98%	98%
Programs for which parents' or guardians' consent was obtained	98%	93%	90%
Programs for which four or more interobserver agreement assessments were obtained	94%	91%	90%

activities after a period of time that they select. But behavior change is often gradual, and treatment may continue over months or years before intervention goals are achieved. Nevertheless, most years, at least 80% of behavior-decrease programs are scored as producing favorable behavior change.

On the last evaluation, 98% to 100% of programs were scored appropriate or "may continue"; one school behavior-decrease program and four home programs were rated "can't ascertain" because documentation (e.g., information about the target response, measurement procedures, or intervention procedures) was unclear. Ninety percent to 98% of the sampled programs included signed consent given by parents or guardians within the past year or since the last program revision.

Of the 308 programs evaluated, 90% to 94% included four or more interobserver agreement measures that were obtained during the year prior to the evaluation. Many of these programs exceeded the criterion, but if

they had merely met the criterion of four measures per year, that would represent 1,232 interobserver agreement assessments. Of course, there were actually many more interobserver agreement measures, but the total number is not known because not all school programs were drawn into the sample and evaluated.

Using the same protocol as the external evaluator, PCDI co-observers scored a subsample of programs selected by the evaluator. Mean interobserver agreement between the outside evaluator and PCDI co-observers, across all evaluation dimensions, was 98% for school behavior-increase programs, 95% for school behavior-decrease programs, and 93% for home programs.

These evaluation data, obtained annually for nearly 2 decades, led to the establishment of benchmarks; a score of 80% or better on an evaluation dimension is regarded as a positive outcome; scores below that benchmark indicate that major corrective action is necessary. Of course, every evaluation produces data that generate program revisions and lead to improvements in the curriculum. In addition to scoring the dimensions noted in Table 6.1, evaluators provide verbal and written feedback that enhances intervention.

The 767 school behavior-increase and behavior-decrease programs delivered to 29 students last year represent a mean of 26 programs per student, and the 198 home programs represent an average of 8 programs per student. Over the course of the year, some programs were discontinued because the target skills were acquired, a few were discontinued because they did not achieve the desired outcomes, and new programs were introduced.

A very different assessment of students' progress is a measure of their engagement with activities and other persons. A substantial research literature documents relationships between engagement and the acquisition of new academic, language, social, and self-care skills (Greenwood, 1999). At PCDI, engagement is defined as scrutinizing, manipulating, or otherwise appropriately using instructional or leisure materials; visually attending to an instructor or a peer interaction partner, or following directions (McClannahan, Krantz, MacDuff, & Fenske, 1988). Children are not scored as engaged if they are exhibiting stereotypic, disruptive, or other inappropriate behavior.

Every minute on the minute mark, observers first count (from left to right) and record the number of students present in a classroom or activity area and then count the number of students who are engaged. Repeated observations are summed and converted to mean percentage of students

scored as engaged. At PCDI, engagement measures are used in several ways. Data collected during staff training sessions and performance evaluations provide feedback on instructors' skills. Data on a single student's engagement over a period of time or in different activities show the extent to which he or she exhibits sustained attention to assigned tasks. And periodically, supervisors walk through the school and collect a time sample in each classroom or activity area; this produces a programmatic measure of engagement. Eight recent measures of school-wide student engagement ranged from 83% to 97% (mean = 92%).

After more than 25 years of assessing the engagement of young people with autism, it is evident that, given an effective intervention system, one can expect engagement to be 80% or higher across students, instructors, settings, and time. It is noteworthy that in many day care centers, public school classrooms, and after-school programs for children with and without developmental disabilities, engagement falls far below this benchmark (Favell & McGimsey, 1993; Fishbein & Wasik, 1981; Harris, 1986; Pfiffner & O'Leary, 1987).

The most important outcomes are related to the quality of life of the young people who receive services. Ted lives in one of PCDI's group homes and attends the Institute's adult program. He is not in supported employment because he has frequent seizures that are not well controlled by medication. He is paid for his participation in contract work, and he makes many choices—choices about how to sequence his own activities, choices of meals at the group home, choices of restaurants, and choices of leisure activities. He completes self-care tasks with minimal supervision and contributes to his household by assisting with meal preparation and housekeeping tasks. Although his vocabulary is not large, he enjoys talking about his family members, amusement parks, and favorite restaurants.

Charles also lives in one of the Institute's group homes. His PCDI job coaches take him to his full-time grounds maintenance job at a local college and to after-work activities in the community. He pays his own bills and balances his checkbook. He enjoys movies, videos, and going to baseball games.

Adam lives with his parents. He independently takes a commuter train to his data-entry job in an insurance company. He works quickly, and his error rate is very low; he receives on-the-job assistance when he is given new assignments or when he encounters unexpected situations.

Clark earned a bachelor's degree and is engaged to be married. Alan is attending an out-of-state university, pursuing a degree in special education. George finished high school in his home town and is employed in a

warehouse; Juan is earning good grades in a middle school in his community; and Roger attends a general education elementary school classroom and receives some assistance in a resource room. We are proud of the accomplishments of these young people and appreciative of the ways in which applied behavior analysis has contributed to their futures, but the clock is always ticking. In a teleconference in 2002, Baer noted,

The essence of treatment for autism, in my opinion, is a race against time. We have a great number of behavior changes to make, and we don't have a lot of time in which to make them because once the autistic child becomes an adult—although the laws of behavior don't change just because that has happened—the probability that we can get social programs running for them, aimed at their inclusion in everyday society, becomes much lower. I think the notion of programming an adult back into society is harder to sell than the notion of programming a child's acceptability to society. Therefore, I think we have to make a lot of behavior changes during childhood and not in adulthood if we can possibly avoid it. (Heward & Wood, 2003, p. 297)

Programs for school-age children with autism have a mandate to win this race.

Summary

The Princeton Child Development Institute uses the science of applied behavior analysis in all areas of operation, including administration, staff training and evaluation, intervention strategies, work with families, and program evaluation. The data that are produced in these arenas support integration of all program components, permit rapid error correction, contribute to program fidelity, and foster positive outcomes for students.

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