

Randomized, Controlled Trial of the LEAP Model of Early Intervention for Young Children With Autism Spectrum Disorders

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Abstract

A clustered randomized design was used in which 28 inclusive preschool classrooms were randomly assigned to receive 2 years of training and coaching to fidelity in the LEAP (Learning Experiences and Alternative Program for Preschoolers and Their Parents) preschool model, and 28 inclusive classes were assigned to receive intervention manuals only. In total, 177 intervention classroom children and 117 comparison classroom children participated. Children were similar on all measures at start. After 2 years, experimental class children were found to have made significantly greater improvement than their comparison cohorts on measures of cognitive, language, social, and problem behavior, and autism symptoms. Behavior at entry did not predict outcome nor did family socioeconomic status. The fidelity with which teachers implemented LEAP strategies did predict outcomes. Finally, social validity measurement showed that procedures and outcomes were favorably viewed by intervention class teachers.

Keywords

autism spectrum disorder (ASD), early education programs, experimental studies, peer-mediated

Although the last 30 years have seen a sharp increase in the range of practices shown to impact the behavioral characteristics of autism, relatively little research exists to document the efficacy of comprehensive early intervention models (Odom, Boyd, Hall, & Hume, 2010). Our literature review identified only four randomized controlled trials (RCTs) on comprehensive intervention models at the early childhood level (Dawson et al., 2010; Jocelyn, Casiro, Beattie, Bow, & Kneisz, 1998; Sallows & Graupner, 2005; Smith, Groen, & Wynn, 2000). Moreover, we could not find a RCT at the early childhood level that has reported any fidelity of implementation or social validity data. With the exception of Jocelyn et al. (1998), all other RCTs have focused on discrete trial tactics. Moreover, Jocelyn et al. reported weak findings at best.

Another important dimension of those early intervention trials that showed positive outcomes is that they all took place in developmentally segregated environments. From an intervention standpoint, this issue is fundamental because the most widely replicated (across 88 children in 25 studies) and effective intervention for the core social behavior deficits of children with Autism Spectrum Disorder (ASD) relies on the presence of typically developing peers as intervention agents (Strain & Schwartz, 2009). Of the 12 early intervention programs identified by the National Research Council (2001) as

having some empirical base, only LEAP (Learning Experiences and Alternative Program for Preschoolers and Their Parents) and the Walden Early Childhood Program provide children with ASD with systematic, daily exposure to typical peers. Currently, LEAP stands as one of two evidence-based inclusion models for the education of young children with ASD and the only model implemented in public school settings. As such, we see LEAP as playing a vital role in developing other than maximally segregated service options. In the other operational programs with demonstrations of probable efficacy, children begin their intervention in one-to-one instruction, either in the home, a clinic, or in a class with only children with ASD (Odom et al., 2010).

These one-to-one models of service delivery occasion the question as to whether educational resources are being used most effectively with young children with ASD. To answer this question, it is important to consider that

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one-to-one, tutorial-like instruction is still the predominate and most often advocated teaching strategy for learners with ASD (Dawson et al., 2010; Lovaas, 1995). In fact, of the 12 comprehensive programs identified by the National Research Council (2001), only LEAP and two other programs rely on naturally occurring, incidental teaching arrangements. All other models rely on one-to-one, discrete-trial, or other adult-driven instructional approaches. Significantly, research evaluating the effects of one-to-one versus incidental tactics shows uniformly that the latter approach is either equal to or superior to one-to-one arrangements when generalized child gains are considered (Elliott, Hall, & Soper, 1991; McGee, Krantz, & McClannahan, 1985; Miranda-Linne & Melin, 1992). In a research synthesis of 10 comparative intervention studies on the development of expressive language, Delprato (2001) found that all experiments favored incidental tactics. Even assuming no outcome differences, one would have to favor incidental instruction from a resource allocation basis. By and large, the evidence shows that tutorial-like instruction is not necessary for learning to occur for children with ASD. Thus, we suspect that educational resources spent toward approximating a maximum amount of one-to-one, adult-driven instruction are not well spent. Of course, one-to-one arrangements may also be seen as inhibiting inclusionary service options. However, LEAP can offer a highly effective, manualized, inclusive, developmentally appropriate, and less costly means of service delivery that does not compromise on child outcomes across multiple developmental domains. Thus, we see LEAP as not just benefiting learners with ASD and their families but also helping school districts to allocate their always limited resources more prudently.

The overall research strategy for documenting the efficacy of LEAP has been threefold. First, we have conducted a National Institute of Mental Health (NIMH)-funded study (1982–1995) of LEAP clients as contrasted with similar children who received an alternative, “business as usual” comparison model of early intervention. Summarized results are as follows: (a) Children in LEAP generally show significant reductions in autistic symptoms after 2 years of intervention, comparison children do not (Strain & Cordisco, 1993); (b) children in LEAP make marked developmental progress on intellectual and language measures, comparison children do not (Hoyson, Jamieson, & Strain, 1985; Strain & Hoyson, 2000); (c) on observational measures taken in school and at home, LEAP children are far more socially engaged and appropriate (Strain, Goldstein, & Kohler, 1996); (d) no negative and some positive (e.g., better social skills and fewer disruptive behaviors) outcomes accrue to typical children in the LEAP model (Strain, 1987); (e) gains for LEAP children maintain following program participation with 24 of 51 children enrolled in regular education classes with no signs of developmental regression (Strain & Hoyson, 2000); and (f) adult family members who participated in LEAP are significantly less likely than comparison families

to show signs of significant stress and depression following the early intervention experience (Strain, 1996). This NIMH-funded study began with random assignment. However, after fundamental, nonoverlapping differences between groups were evident after 2 years, a NIMH site visit panel recommended suspension of random assignment for ethical reasons. We fully concurred with this recommendation notwithstanding the obvious compromise in the study design.

Second, we have considered it to be ethically and scientifically necessary to conduct various substudies to demonstrate the efficacy of key model components that are considered to be unique LEAP features. These components include (a) teaching typical children to facilitate the social and communicative competence of their class peers with ASD, (b) teaching Individualized Education Plan (IEP) objectives within routine class activities, and (c) providing extensive skill training for family members to address child behavior issues in home and community settings. The summarized results from these areas of study follow: (a) Typically developing peers as young as 36 months can be taught to utilize facilitative social and communicative initiations with their peers with ASD (Goldstein & Wickstrom, 1986; Strain & Bovey, 2008; Strain & Danko, 1995); (b) peers’ use of facilitative strategies result in higher rates of communicative interaction for preschoolers with ASD (Goldstein & Wickstrom, 1986; Kohler & Strain, 1999; Strain, 1987); (c) the peer facilitative strategies produce “day one” effects, suggesting that the delayed social and communicative abilities of many young children with ASD may be attributable, in part, to the socially nonresponsive, developmentally segregated settings in which they are most often educated (Kohler & Strain, 1992; Strain & Odom, 1986); (d) for many children who receive the peer-mediated intervention, their eventual level of social participation falls within the typical range for their age cohorts (Strain, 1987); (e) the potency of the peer-mediated intervention extends across both settings (Strain, 1987; Strain & Hoyson, 2000) and time (Strain et al., 1996); (f) the naturalistic or incidental teaching used at LEAP to influence cognitive outcomes yields approximately 1-month developmental gain for each month enrolled (Hoyson et al., 1985; Strain & Bovey, 2008; Strain & Cordisco, 1993); (g) when compared with one-to-one, tutorial instruction, the LEAP incidental teaching model yields more active engagement and more complex developmental skills by children with ASD and their typical peers (Kohler & Strain, 1999); and (h) LEAP’s parent skill training component produces broad-based and long-lasting effects, including (a) family use of skills in naturalistic contexts, (b) child behavior improvements in active engagement and challenging behaviors, (c) high levels of family satisfaction with the training program, and (d) decreased levels of stress and depression, especially as families exit the intervention program and move to what they perceive to be less supportive service programs (Strain, 1987, 1996). Together, the over 28 peer-reviewed component analysis studies far exceed the

“efficacious” intervention criteria for within subject designs as established by Division 12 of the American Psychological Association (Lonigan, Elbert, & Johnson, 1998). Specifically, using single-case designs, the peer social initiation component has been replicated across 88 participants, the incidental teaching component has been replicated across 24 participants, and the family component has been replicated across 50 participants. In addition, this number of replications meets or exceeds the number of participant replications (20) required by the What Works Clearinghouse (WWC) for single-subject designs to meet the highest efficacy standard (WWC, 2010a).

Third, in spite of these prior data, we determined that the overall efficacy of enrollment in LEAP could not be argued without a randomized trial. This RCT was funded by the Institute for Education Sciences (IES) under the “efficacy and replication” goal. To qualify for support under this competition, several requirements must be met, including (a) the intervention must be fully developed and to the extent possible, manualized; (b) prior data must provide a convincing case about potential efficacy; and (c) the intervention must be implemented in authentic educational settings by typical intervention agents. To date, all prior RCTs with demonstrable outcomes at the early childhood level have occurred in specialized settings, most often at universities.

We attempted in this RCT to correct a number of shortcomings in prior early intervention ASD efficacy trials. First, we instituted an observational system to provide a detailed portrayal of treatment fidelity. Although single-case designs on children with ASD have long utilized fidelity of treatment measures, such has not occurred in RCTs of comprehensive treatments. Without direct and repeated assessment of the independent variable(s), it is difficult to argue that a particular treatment approach was in place. Second, no prior RCTs have examined issues around consumer satisfaction or social validity (Wolf, 1978). In this study, participating teachers provided detailed feedback on their coachee experiences moving toward high levels of fidelity and on their perceptions of the behavioral changes in children. In this regard, it is important to note that a growing body of research suggests a clear link between practitioners “liking” of an intervention and their implementing that intervention with fidelity (Strain, Barton, & Dunlap, in press). Third, all prior RCTs have been limited by the number of participants (maximum of 48 children in Dawson et al., 2010). Given the enormous behavioral heterogeneity among children with ASD, small sample sizes limit both internal and external validity and preclude analyses of differential outcomes across participants who may range widely in developmental capabilities. Finally, as noted earlier, all prior RCTs have involved interventions delivered outside of public school settings. Existing preschool staff in inclusive settings from around the United States were coached to fidelity on the LEAP model. No extra services or outside experts were ever involved in the delivery of intervention.

The overall study had five primary research questions:

Research Question 1: Do differential child outcomes occur across study groups after 2 years of LEAP implementation?

Research Question 2: What is the relationship between implementation fidelity and child outcomes?

Research Question 3: Are teacher’s characteristics correlated with child outcomes?

Research Question 4: Does child performance at the beginning of intervention predict ultimate outcomes at 2 years?

Research Question 5: How do teachers rate the social validity of their experience implementing LEAP?

Method

Overall LEAP Description

The LEAP model has a number of unique features that contribute to its effectiveness and relatively lower costs. These features include the following:

1. Inclusion begins full-time from Day 1 in LEAP preschool classrooms. Children with ASD are provided with the necessary level(s) of prompting, classroom and curricular adaptations and modifications, and general support to participate immediately in peer-mediated social skill intervention.
2. The design of LEAP classrooms begins with establishing a setting of high quality for typically developing children. LEAP has been implemented effectively in classrooms utilizing a variety of preschool models and curricula, including the Creative Curriculum for Preschool–4th edition (Dodge, Colker, & Heroman, 2002), High Scope, and Head Start programs. In the context of this programming, systematic intervention is embedded in typical preschool routines (e.g., circle time, free play/centers, snack, small groups, etc.) with the aim of offering hundreds of meaningful, socially relevant learning opportunities every day.
3. Typically developing children play a major intervention role in LEAP. The typically developing children are provided with comprehensive social skills training such that they can facilitate the social and communicative behaviors of peers with ASD. This systematic, peer-mediated instruction has been shown to produce a Day-1 intervention effect for the children with ASD (Strain & Schwartz, 2009).
4. Learning objectives are written in such a fashion that teaching continues until generalized behavior change is achieved. Learning objectives are further described according to relevant prompting hierarchies. Thus, program data are collected

on children's behavioral movement toward the rigorous standard of independent, generalized performance, not in terms of percentage correct, trials accomplished, or similar indices. Data are reviewed daily and strict decision-making rules demand intervention changes in the absence of clear behavior change.

5. Skill training for families focuses on providing adult family members with the behavioral teaching strategies sufficient for them to experience less stress and more pleasure in daily routines, such as meals, bedtime, dressing, and community outings.
6. Intensity in the LEAP model is not defined by hours per week that individuals are paid to deliver service. We believe that the algorithm defining intensity is complex and includes, for each developmental domain of concern, the following factors: (a) number of meaningful opportunities to respond, (b) the functionality of objectives chosen, (c) the selection of an instructional method that maximizes children's engagement and minimizes errors, (d) the competence of staff to deliver with fidelity the chosen intervention, and (e) the use of data systems and decision-making rules that minimize children's exposure to less-than-optimal interventions.
7. LEAP is unique in that we utilize a variety of science-based intervention approaches, including (a) peer-mediated interventions, (b) errorless learning, (c) time delay, (d) incidental teaching, (e) pivotal response training, (f) picture exchange communication system (Frost & Bondy, 1994), and (g) positive behavior support. We believe the enormous heterogeneity of ASD precludes the use of one or a few instructional approaches.

Overall Study Design

We instituted a clustered randomized comparison design in which preschool classrooms matched on program dimensions such as number of program days per week (5) and length of program day (2.75–3 hr) and were assigned, via a table of random numbers, to either the full-scale LEAP replication training or to a comparison condition in which preschool staff were provided intervention manuals and related written materials only. We elected to use this particular comparison group arrangement for the following reasons. First, our experience using a general community standard of practice versus the LEAP model suggested that similar comparisons may be trivial, providing little useful data. Second, our prior experience establishing some 50 replications across the United States suggested that child outcome data closely matched that of our original experimental cohort. Third, because the intervention to

be studied occurred at the classroom level, it followed logically to randomly assign classrooms. Finally, because our treatment manuals have been commercially available, more than 1,000 districts have purchased these materials and only a handful had been involved in formal replication. Thus, using our treatment manuals without follow-along training was a logical standard for comparison purposes.

In this RCT, the primary threats to internal validity centered on historical and maturational variables that may influence practitioner behavior and child outcomes. Randomization in study group status along with equating preschools on dimensions of adult-child ratio (1:5), full inclusion (all services received in classrooms), and intensity of services (17 hr/week on average) offered the best available analytic model. Notwithstanding random assignment, we tracked the prior education and experience of participating staff and conducted appropriate correlational analyses to determine if these trainee characteristics would predict outcomes. Initial functioning levels for children and family characteristics were also examined in our analytic model as potential correlates of outcomes. In both cases, we detected no significant correlations, replicating our prior data (Strain & Hoyson, 2000).

Classroom sites were recruited on a nationwide basis (16 school districts across 7 states) to promote maximum generalization of findings (address external validity issues). In our recruitment, we have large metropolitan districts, suburban districts, rural districts, geographic areas where all staff have advanced degrees, geographic areas where personnel shortages are critical, districts that primarily provide inclusionary services, and districts where very few children with ASD were in inclusive settings. Of the 27 intervention classrooms that ultimately participated, 14 were from metropolitan areas, 10 were suburban, and 3 were rural. The 23 comparison classes included 12 metropolitan, 8 suburban, and 3 rural settings.

Participant Selection

Prior to random assignment to study groups, we "overrecruited" classrooms from school district settings that were willing and able to be LEAP replication sites. Having this unique universe of potential sites was crucial for the following reasons. First, we strongly support Kazdin's (2003) position that willingness or implementation commitment must be equivalent across groups in any psychosocial trial. Second, restricting ourselves to "able" sites alleviated a number of potential confounds. Specifically, able sites shared these commonalities: (a) intensity of services provided, (b) enrollment of children with ASD in inclusive settings, (c) minimum ratio of adults to children (1:5), and (d) minimum ratio of typical peers to children with ASD (2:1). Each of these variables has been related to developmental outcomes for children with ASD (Lovaas, 1982; McGee, Morrier, & Daly, 1999; Strain & Hoyson, 2000; Strain, Wolery, & Izeman, 1998).

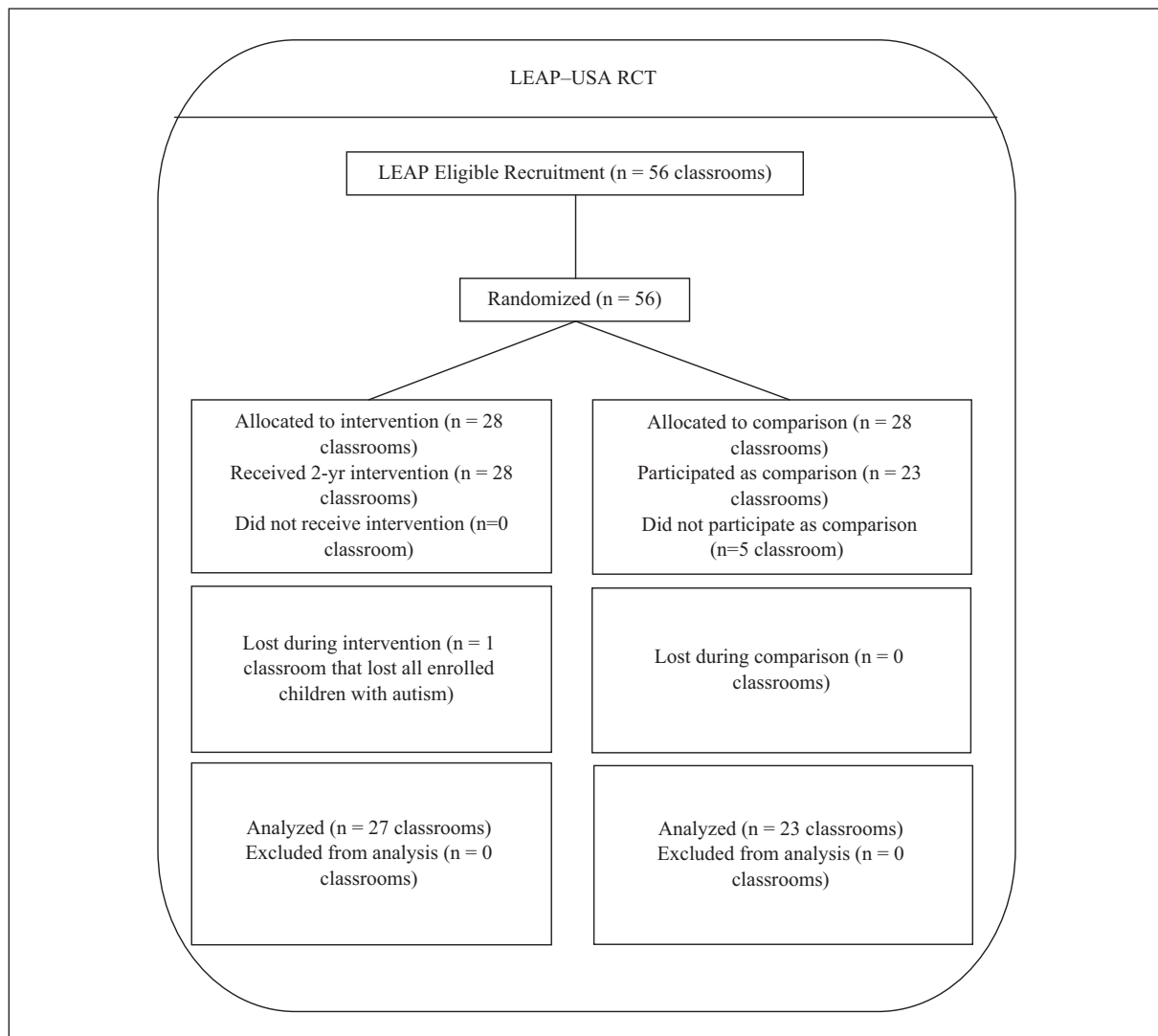


Figure 1. LEAP—USA CONSORT Diagram

LEAP = Learning Experiences and Alternative Program for Preschoolers and Their Parents.

Recruitment of classrooms began in Year 1 (first cohort) and in Year 3 (second cohort) by contacting school districts that had previously indicated some level of interest in the LEAP model. When district-level personnel agreed to participate in the study, we asked that they then identify two to four inclusive classrooms with the understanding that one or two would be randomly assigned to the full intervention arm of the study. To provide data to address a number of generalization issues, we let variables of provider education and experience vary as they might.

During Year 1, we recruited 30 classrooms from which we randomly assigned 15 to our full replication protocol and 15 to receive treatment manuals only. Because of uncontrollable decisions specific to district-related child placements, we ended up with 12 classrooms in the manuals-only comparison condition. Specifically, three of the

designated comparison classes did not ultimately have children with ASD enrolled as planned and no data were ever derived from these settings.

In Year 3, we recruited 26 classrooms and randomly added 13 classrooms to the intervention protocol and an additional 13 classrooms were assigned to the manuals-only comparison condition. Again, as a result of district decision making around child placement, two of the assigned comparison classes did not have children enrolled with ASD as planned, and no data were derived from these classrooms. Across all sites and all years, we had the following study participants: (a) 123 experimental teachers and 107 comparison teachers and (b) 177 experimental children with ASD and 117 comparison children with ASD. The CONSORT diagram for the RCT is in Figure 1.

Table 1. Key Input Differences Between LEAP Replication Classes and Manuals-Only Classes

LEAP model components contained in the QPI	Full replication training group	Manuals-only comparison group
Classroom organization and planning	Written instruction, initial didactic training, Power Point presentations, classroom coaching, and assistance with physical design of classroom	Written instruction and Power Point presentations
Teaching strategies	Written instruction, initial didactic training, Power Point presentations, classroom modeling and coaching, fidelity checklists	Written instruction and Power Point presentations
Teaching communication skills	Written instruction, initial didactic Training, Power Point presentations, video examples, classroom modeling and coaching, and fidelity checklists	Written instruction and Power Point presentations
Promoting social interactions	Written instruction, initial didactic training, Power Point presentations, video examples, and classroom modeling and coaching	Written instruction and Power Point presentations
Providing positive behavioral guidance	Written Instruction, Initial Didactic Training, Power Point Presentations, Classroom Written Plan, Classroom Modeling and Coaching	Written Instruction & Power Point Presentations
IEP's and measuring progress (data collection)	Written instruction, initial didactic training, Power Point presentations, workshop training, classroom written plan, and classroom modeling and coaching	Written Instruction and Power Point Presentations
Interactions with children	Written instruction, & Power Point presentations, and classroom modeling and coaching	Written instruction and Power Point presentations
Interactions with families	Written instruction, DVD overview, modeling, and coaching	Written instruction and DVD overview

Abbreviations: LEAP = Learning Experiences and Alternative Program for Preschoolers and Their Parents; QPI = Quality Program Indicators; IEP = Individualized Education Program.

Experimental Conditions

Preschools assigned to the comparison condition were provided LEAP's intervention manuals, videos, and training presentation materials (Power Point presentations) for (a) family skill training, (b) social skills training, and (c) design and operation of the inclusive classroom. We should note that former family members at LEAP have coauthored all manuals. We provided no follow-along training to these sites. However, we did interview district administrators on a yearly basis to track the amount and type of general, district-provided training afforded to staff.

Preschools assigned to the full LEAP replication protocol entered into a 2-year training and mentoring relationship with our staff. The details of this protocol, refined over a 15-year period, follows below. To instruct replication site participants in the basic LEAP components, we used a seven-phase educational model, comprised of (a) presentation of skill area to be learned in written/presentation format, (b) discussion of skill area between trainee(s) and trainer(s), (c) demonstration of skill by LEAP trainer with simultaneous observation by trainee(s), (d) in-vivo practice by trainee(s) with observation and feedback provided by trainer, (e) evaluation of trainee competency based on direct observation or permanent product, (f) training of on-site

supervisor to support direct-line replication staff, and (g) follow-up training and maintenance checks on a 6 to 8 week basis. Table 1 provides a detailed overview of experimental input differences between the two study groups related to the eight components of LEAP's Quality Program Indicators (QPIs), our fidelity of implementation observation measure (see further details on the QPI next). For the full replication classrooms, including all types of support, settings received approximately 23 full days of training and coaching support over 2 years.

Appendix A provides the reader with an overview of LEAP Intervention Manual components and a brief overview of the full 2-year coaching process.

Fidelity of Intervention Concerns

For 14 years, we have used an implementation protocol in the form of a procedural rating scale (QPI). The QPI consists of eight content areas (*Classroom Organization and Planning, Teaching Strategies, Teaching Communication Skills, Promoting Social Interactions, Providing Positive Behavioral Guidance, IEPs and Measuring Progress/Data Collection, and Interactions With Children and Interactions With Families*) with each content area having four to six unique indicators. Classrooms are scored on each indicator

on a 1 = *needs work* to 5 = *full implementation* scale, and an average is taken from these indicators to provide a score for each content area. The QPI has good, short-term test-retest reliability (.88 across 3 days); it is sensitive to training effects; and implementation of all components predicts child engagement increases and rapid growth on social, cognitive, and language measures (Strain & Hoyson, 2000). Based on prior use, study raters observed a classroom for one full day and then completed the scale. The observational manual is available from the first author. The QPI is scored for a classroom as a whole and thus is not dependent on specific staff that may be present or not at assessment times. Such ratings occurred at study onset and then at approximately 6-month intervals at all sites thereafter. This 6-month interval was based on 14 years of prior replication work that showed that changes on the QPI were not likely to occur prior to this interval. Training staff had access to these data and they used this information to guide follow-along coaching for the intervention classrooms. The QPI scale in abridged form is available in Appendix B.

Child Measures and Measurement Methods

We designed the measurement protocol with the following considerations in mind: (a) We wanted to compare child outcomes at replication sites with our initial comparison intervention study of LEAP, (b) we wanted to address the defining characteristics of autism (i.e., language deviations, social isolation, overall developmental delay, and various forms of aberrant behavior), (c) we wanted to select measures that have demonstrated sensitivity to similar interventions, and (d) we wanted to use measures that provide reliable and valid data. All child measures took place each year within a 30-day window around October 1st and May 1st.

Child Outcome Measures

Childhood Autism Rating Scale (CARS). Although the CARS (Schopler, Reichler, & Renner, 1988) is occasionally used as a diagnostic instrument, our prior and current use of this instrument focuses on its ability to document the severity of autistic symptoms. The CARS is comprised of 15 items addressing behavioral characteristics associated with autism. Raters observed the child in question during a standardized developmental assessment (Mullen in our case) and then rated each item on a 7-point scale. Short-term test-retest reliability and internal consistency are quite good ($r = .86$). Moreover, concurrent validity studies have shown that children who reach the autism threshold on the CARS are also diagnosed on the spectrum using the psychiatric gold standard—the Diagnostic and Statistical Manual (4th ed.; *DSM-IV*; American Psychiatric Association, 1994). The CARS was completed at start and at 6-month intervals thereafter.

Mullen Scales of Early Learning. This developmental scale provides an assessment of child performance in visual reception, fine motor, receptive language, expressive language, and a composite representing general intelligence. The Mullen (Mullen, 1995) has excellent internal reliability (.91) and short-term test-retest reliability (.95). It correlates highly with the Bayley (.70), and it is predictive of school readiness as measured by the Metropolitan Readiness Test (.50). Compared with other available measures of overall developmental functioning, we chose the Mullen because of its brief time of administration. The Mullen was administered at start and at 6-month intervals for each child participant.

Preschool Language Scale (4th ed.; PLS-4). The PLS-4 (Zimmerman, Steiner, & Pond, 2002) provides a comprehensive assessment of children's receptive and expressive communication competence. The PLS-4 is extensively used in clinical and research contexts, largely because of its comprehensiveness, sensitivity to child behavior during testing, and excellent psychometric properties. Test-retest reliability exceeds .90 as does internal consistency. In terms of validity, the PLS-4 discriminates between children diagnosed previously for language disorder, ASD, and hearing impairment. Compared with other available instruments, we chose the PLS-4 because of the larger number of items at the beginning levels of receptive and expressive language. The PLS-4 was administered at start and at 6-month intervals thereafter for each child participant.

Social Skills Rating System (SSRS). The teacher form of the SSRS (Gresham & Elliott, 1990) was used to assess changes in child participants' social skill development and problem behavior. Internal consistency for the SSRS is quite high (.96) as is 6-week test-retest reliability (.90). In terms of criterion-related validity, the SSRS correlates highly with the Child Behavior Checklist (.81) and the Walker-McConnell Scale of Social Competence (.75). It is also evident that the SSRS is sensitive to intervention effects (Gresham, 2000). Teachers completed the SSRS at start and then every 6 months for each child participant.

Social validity measure. At the end of our 2-year consultation process, the lead teacher in each intervention class was asked to complete a 5-point rating scale (see Appendix C) that was designed to assess consumers' judgments on key dimensions of their consultation relationship with LEAP coaches. The 14 dimensions of social validity were based on Kohler and Strain's (1992) review of practice dimensions shown to influence long-term use of evidence-based practices.

We assembled a group of assessors for this project who had 5 to 10 years of experience with the assessment procedures, who demonstrated competency compared with a standard of practice, who were fluent in Spanish, and who had experience testing young children with ASD. Prior to collecting any of the direct observational fidelity data, the

Table 2. Fidelity of Implementation Data for Full Replication and Manuals-Only Classes at Start, End of Year 1, and End of Year 2

	Full replication classes			Manuals-only classes		
	Start	End of Year 1	End of Year 2	Start	End of Year 1	End of Year 2
Mean QPI scores	2.06	3.12	4.49	1.91	2.22	2.52
QPI range	1.00–2.84	1.75–3.89	3.08–5.00	1.03–3.25	1.53–3.33	1.09–4.67
Mean implementation	27%	53%	87%	23%	31%	38%
Implementation range	0%–46%	19%–72%	52%–100%	0%–56%	13%–58%	2%–92%

Abbreviations: QPI = Quality Program Indicators.

Table 3. Study Participants' Data For Full LEAP Replication and Manuals-Only Groups at Start

	Full replication		Manuals only		<i>p</i> scores
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Age at entry (months)	50.1	4.6	50.7	4.2	>.49
CARS	39.0	6.2	37.4	5.9	>.34
PLS-4 (total language score) ^a	32.8	7.5	34.4	7.2	>.28
Mullen					
ELC ^b	59.6	6.9	63.2	6.6	>.19
Visual reception ^a	32.3	6.6	34.6	7.0	>.26
Fine motor ^a	31.9	6.4	34.8	6.2	>.22
Receptive language ^a	30.8	7.6	33.4	9.0	>.19
Expressive language ^a	28.9	7.4	30.3	8.2	>.29
SSRS					
Positive ^c	13.5	21.5	20.7	20.2	>.13
Negative ^c	63.5	15.2	53.4	16.5	>.17

Abbreviations: CARS = Childhood Autism Rating Scale; ELC = Early Learning Composet; PLS = Preschool Language Scale; SSRS = Social Skills Rating System.

^aAge (months developmental) equivalent

^bStandard score

^cPercentile rank score

assessors established interobserver reliability at .85 or above across four separate classrooms. Thereafter, observer agreement on this implementation measure was checked on 20% of all occasions for both groups of classrooms.

Results

Fidelity of Implementation Data

Table 2 summarizes the fidelity of implementation data across intervention and comparison classes at the beginning of study involvement, at the end of Year 1 and at the end of involvement (2 years elapsed). As indicated in Table 2, intervention classes reached a very high level (mean of 87%) of implementation on the QPI observational protocol. Comparison classes that received LEAP intervention manuals also made progress over time, improving their level of implementation to an average of 38% of program components.

Interobserver agreement on the QPI was calculated for 20% of the observations for each arm of the study and averaged 88% in the study, ranging from 80% to 97%.

Child Outcomes

Child outcome highlights are as follows: (a) An analysis of variance demonstrated that both groups were equivalent on all child measures prior to intervention (see Table 3); (b) teacher experience and training was equivalent across groups; (c) we experienced less than 3% child attrition, evenly split across study groups and cohorts, between initial assessment and Year 2 follow-up measures. All study withdrawals were due to the child's family relocating out of the school district. We detected no initial differences between participants who stayed versus those who did not, and following Hedges (2007), we "estimated" the effects

Table 4. Child Outcomes After 2 Years of Study Participation

	Full replication			Manuals only			ES
	<i>M</i>	<i>SD</i>	Δ	<i>M</i>	<i>SD</i>	Δ	
CARS	32.9	3.9	-6.1	34.6	4.2	-2.8*	0.59
PLS-4 (total language score) ^a	51.3	8.1	18.5	43.8	7.7	9.4**	0.92
Mullen							
ELC ^b	68.5	7.5	8.9	61.4	9.0	-1.8**	0.89
Visual reception ^a	52.7	11.5	20.4	46.3	11.6	11.7**	0.80
Fine motor ^a	43.3	5.2	11.4	39.8	4.9	5.0*	0.81
Receptive language ^a	49.3	7.9	18.5	40.7	7.7	7.3**	0.89
Expressive language ^a	38.7	6.4	9.8	35.9	4.4	5.6*	0.60
SSRS							
Positive ^c	42.1	12.6	28.6	32.7	11.9	12**	1.22
Negative ^c	56.5	4.2	-7.0	49.1	4.1	-4.3*	0.62

Abbreviations: CARS = Childhood Autism Rating Scale; PLS = Preschool Language Scale; SSRS = Social Skills Rating System; ES = Effect size difference between Δ for full replication and Δ for manuals-only group; Δ = Mean differences between initial assessment and Year 2 data.

^aAge (months developmental) equivalent

^bStandard score

^cPercentile rank score

* $p < .05$. ** $p < .01$ comparing Δ for full replication and Δ for manuals-only group

for attritions by using a “worst case” scenario, thereby biasing against finding group differences; (d) one lead teacher in each cohort (two total) of full replication classes was lost to attrition and replaced by the school district; (e) on standardized measures of cognitive development (Mullen) and language development (PLS-4), children in intervention classes made, on average, twice the developmental gain as compared with comparison class children; (f) on a standardized measure of autism symptom severity (CARS), children in the treatment classes showed an average reduction in severity of 6.1 points as compared with an average reduction of 2.8 points for comparison class children; (g) on a standardized measure of social behavior growth (SSRS), children in intervention classes showed an average positive percentile change of 28.6 points versus 11.9 points for comparison class children; and (h) on the problem behavior scale of this same measure (SSRS), children in treatment classes showed an average positive percentile change of 7.0 versus 4.3 points for the comparison cohort (see Table 4).

Multivariate repeated-measures analysis of variance was performed on clusters of classrooms, not individual child data. All differences between groups were significant at the .05 level and beyond. This analytic method was chosen because we had (a) no “missing data”, (b) the assessment schedule was consistent across all participants, (c) this analytic method was appropriate to the basic study design, and (d) multivariate repeated-measures analysis of variance has been used in all prior early childhood autism RCTs. Although hierarchical linear modeling was a theoretically plausible analytic method, power was not found to

be sufficient to utilize this analytic model. It is also true that the data set would permit growth curve analyses; however, our theory of change ran counter to this analytic method. Specifically, our prior data from replication sites showed that differential child growth was not linear but only manifested after 2 years, when most LEAP components were in place.

Following Hedges’s (2007) recommendation, we adjusted student’s *t* and degrees of freedom ($-2 df$) in line with total sample size, cluster size, and intraclass correlations (.022 in this study) prior to conducting multivariate repeated-measures analysis of variance. It is important to note that the .022 intraclass correlation suggests that child behavior samples within clusters (classes in this case) were essentially independent. The intraclass correlations were derived from the most current analysis procedure in SPSS. The significant group differences (see Table 4) represent effect sizes ranging from .59 to 1.22. Effect sizes were based on Glass’ estimator (Hedges, 1981) and all reached statistical significance.

In addition to the analyses discussed above, we were able to detect important correlations between our fidelity (QPI) measure scores and child outcomes in our treatment and comparison groups. Put simply, “best outcome” was associated with the highest levels of fidelity on each outcome index (gain score; ranged from $r = .67$ for SSRS [negative] data to $r = .86$ for PLS-4 data; see Table 5).

Social Validity Ratings

Table 6 summarizes the range and mean ratings of intervention class lead teachers, specific to 14 dimensions of social validity.

Table 5. Correlation Between QPI Scores at End of Year 2 and Each Outcome Index Gain Score for Full Replication and Manuals-Only Classes

Outcome measure	Full replication <i>r</i>	Manuals only <i>r</i>
CARS	.71	.73
PLS-4 (total language score) ^b	.86	.75
Mullen		
ELC ^a	.72	.68
Visual reception ^b	.69	.75
Fine motor ^b	.80	.77
Receptive language ^b	.69	.69
Expressive language ^b	.75	.70
SSRS		
Positive ^c	.82	.72
Negative ^c	.67	.72

Abbreviations: CARS = Childhood Autism Rating Scale; PLS = Preschool Language Scale; SSRS = Social Skills Rating System.

^aAge (months developmental) equivalent

^bStandard score

^cPercentile rank score

Table 6. Social Validity Ratings by Lead Teachers in Full Replication Classes

Social validity dimension	Mean rating on 5-point scale	Range of ratings
Applied	4.88	4–5
Effective	4.42	3–5
Flexible	4.46	2–5
Generalizable	4.25	3–5
Inexpensive	4.25	2–5
Practical	4.00	1–5
Simple	4.04	2–5
Socially acceptable	4.83	3–5
Sustainable	4.54	3–5
Technology	4.71	4–5
Promoting community inclusion	4.63	2–5
Promoting social relations	4.50	3–5
Promoting general progress	4.50	3–5
Reducing problem behavior	4.38	2–5

As seen in Table 6, teacher consumers had very favorable ratings of their experience with the LEAP replication process. For the subgroup of teachers in the intervention cohorts, we examined the relationship between social validity ratings and fidelity scores at the end of coaching. The correlation between these measures was highly significant ($r = .89$).

Methods used to mitigate bias in the data gathering and analytic processes included (a) keeping assessors naïve to study hypotheses; (b) having a personnel “firewall” separating staff who were working with sites to reach fidelity and those collecting outcome data; (c) having data collection, scoring, and storage subject to multiple reliability/accuracy checks; and (d) having outcome data processed independent of the principal investigator.

Discussion

The results of this RCT on young children with ASD revealed the following results: (a) Fidelity of implementation data showed that intervention classes reached high levels of fidelity (nearly 90% of practices in place) after 2 years of coaching, whereas comparison classes using the same manualized materials independent of coaching were implementing 38% of LEAP practices after 2 years; (b) children in intervention classes made significantly more progress than comparison children at the end of 2 years on measures of cognitive, language, autism symptoms, problem behavior, and social skills; (c) differential child outcomes were not correlated with initial baseline performance, lead teachers’ level of experience or prior training, or with family socioeconomic status; (d) significant correlations were found between fidelity scores in intervention and comparison classes and all child outcomes; and (e) the primary teachers in intervention classes rated their experience implementing LEAP practices very high, and they judged child behavior change to be attributable to these practices.

To our knowledge, this is the first comprehensive early intervention RCT in the autism field to report fidelity of treatment data. Looking specifically at items on the QPI that comparison classes did not implement, several consistent trends emerged. Specifically, comparison classes never implemented data systems, whereby daily progress guided future instructional practices. Comparison classes were also far less likely to individualize instructional practices, carefully teach typical peers to be instructional agents, or use function-based practices to impact problem behavior. This kind of component analysis of implementation data, we suggest, is a significant ingredient in bringing the field closer to understanding the operational variables within comprehensive program models that influence behavior change. Of special interest is the adoption of data systems by full implementation classrooms. Prior data (Farmer, Wolery, Gast, & Page, 1988) suggests that getting early childhood special education (ECSE) teachers to implement and sustain the use of ongoing data systems has been difficult. We attribute our success to the following: (a) all full LEAP replication teachers were told from the outset that implementing all components to fidelity was necessary, (b) data systems were simplified into once-daily ratings of behavior that took seconds to complete, and (c) coaches always asked to see the data once

the systems had been introduced and their use was demonstrated.

The length of time needed for full replication classes to reach fidelity and the coaching practices used to achieve same have important professional development implications. In our 25 years of replicating LEAP, we have been contacted by hundreds of schools that are interested in having their teachers “trained” in LEAP. In the overwhelming number of cases, these motivated sites initially have designated 1 to 3 days of in-service training to accomplish the task. The gulf between a brief training event and 2 years of on-site coaching to fidelity is enormous and suggests that the ECSE field has not done an adequate job to date of communicating to administrators the complexity of installing comprehensive, evidence-based interventions.

Although there are RCTs in the autism field that have reported larger effects on isolated outcomes (e.g., Mullen Early Learning Composite scores in Dawson et al., 2010), no study has found significant outcomes on the full range of outcomes specific to the defining features of ASD. The fact that intervention class children made significantly greater progress than comparison class children on all measures is encouraging. Moreover, this effect was not related, as it has been in other studies (e.g., Lovaas, 1987; Smith et al., 2000), to improvement by children who were higher functioning at the beginning of intervention. Finally, it is critical to note that these outcomes were achieved in settings in which children received, on average, 17 hr of intervention per week. This level of intensity is 50% to 60% less than that offered in prior RCTs. Thus, it appears that LEAP strategies are not just effective but also efficient in producing wide-scale behavioral change (see Strain et al., 1998, and Wolery & Bailey, 1984, for discussions on the issue of intervention efficiency). Of course, direct comparisons between intervention models and associated outcome data are highly suspect in the absence of randomized studies that directly compare approaches.

There is abundant data to suggest that service providers are unlikely to adopt, use, and maintain practices that are deemed to be impractical, too expensive, or inconsistent with their values (Strain et al., *in press*; Wolf, 1978). The social validity ratings of teachers suggest that they were very positive about LEAP strategies and associated behavior changes by students. Moreover, we identified a significant correlation between classroom fidelity ratings and the social validity ratings of associated teachers. These supportive social validity ratings bode well for future replication and scale-up efforts with the LEAP model.

There are a number of limitations to this RCT that should be acknowledged. First, we clearly made compromises in child assessment methods by not using direct observational measures of child behavior related to autism symptoms, communication skills, and social behaviors. This was first and

foremost a financial decision. We estimate that the RCT would have been four times as costly had we deployed observers to collect these kinds of data, and, as it was, we were funded at the maximum level for “efficacy and replication” trials. In prior single-case designs specific to LEAP components, we have utilized such direct observational measures, and we maintain that these data sources are superior to episodic measures as used in this RCT. That superiority is related to ecological validity (Kennedy, 1992), providing a link between environmental variables and behavior (Horner & Day, 1991) and the sheer amount of behavior “samples” provided (Schwartz & Baer, 1991). If the field of ECSE is to go forward with additional efficacy trials, it seems important to acknowledge the inevitable compromises around measurement methods when large numbers of children are studied across distant sites with predetermined funding limits.

Conducting the RCT in “authentic” settings also imposed limitations on the child participants and related diagnostic information. Specifically, we did not have independent, confirmatory diagnoses of autism. However, it is the case that the participating districts had all taken numerous steps to create and staff the classrooms in the study to serve children they considered to have ASD. These steps included their own idiosyncratic methods for arriving at an “educational” diagnosis of ASD, relying on medical records provided by parents that included an ASD diagnosis, and using autism screening tools (e.g., MCHAT, ADOS) to qualify children for these ASD-specific settings. We would note also that baseline data on the CARS showed participants to be in the moderate to severe range of autism symptoms.

We should also point out that children in the full replication classes were only exposed to a brief period of time during which most model components were in place. The fact that it took most classes the full 2-year coaching period to reach fidelity, along with the positive correlations found between fidelity and each outcome index, indicates that this RCT may actually underestimate the potential impact of LEAP practices once fully in place.

In summary, this study represents the first RCT of a classroom-based, public provider-implemented intervention for young children with ASD. The study also breaks new ground in the use of fidelity of implementation and social validity measures. In addition, the results are unique in the breadth and efficiency of effects across all key defining characteristics of ASD. Finally, this is the first RCT to demonstrate that behavioral teaching tactics other than discrete trials produce broad developmental improvements. The resource allocation implications are nothing less than profound as LEAP’s costs are estimated at US\$20,000 per child per year versus between US\$45,575 and US\$69,050 for one-on-one, discrete-trial methods (WWC, 2010b).

Appendix A

LEAP Training Content

LEAP District Training Manual

Lesson 1: Overview of the LEAP Program

- The LEAP Model
- Empirical support of the LEAP Model
- The integrated preschool
- The family component
- National outreach training
- References for LEAP research studies

Lesson 3: Classroom Organization and Management

- Classroom Environment and Organization
- Developmentally appropriate practices
- Managing classroom space and materials
- Reading and using the lesson plan
- Adapting instructional strategies and materials
- Getting to know the students
- Establishing and maintaining attention
- Teaching children new skills
- Strategies for promoting language

Lesson 5: Data Collection

- Monitoring progress on children's IEP goals
- Data collection procedures
- Hierarchy of prompts
- Collecting data on IEP goals
- Child engagement data
- Collecting data of children with variable behavior or on medication
- Collecting data of social skills
- Collecting functional analysis data
- Building data collection into the classroom routine

Lesson 2: Overview of Autism

- Pervasive developmental disorders
- Characteristics of autism
- Patterns of learning
- Suggested literature
- Contact Agencies

Lesson 4: Responding to Undesirable Behaviors

- The ABC's of behavior
- Conducting a functional analysis of problem behavior
- Developing a behavior plan
- Structuring the environment
- Giving directions
- Monitoring procedures
- Types of reinforcement
- Interruption and redirection
- Extinction of misbehavior
- Time out procedures

Lesson 6: Social Skills Programming

- Importance and need for social skills
- Teacher ideas for promoting interactions
- Play activities for promoting social interactions
- Prompting and reinforcing interactions
- LEAP's Social Skills Curriculum
- Incorporating interactions into the daily routine

Collecting Data of IEP Objectives

Classroom Management in the Inclusive Classroom

Introduction to the Inclusive Classroom

- Preface
- What does inclusion mean?
- What are the benefits of inclusion?
- Legislative support for inclusion

Module 2: Teaching Children to Follow Directions

- Reasons children do not follow directions
- Ways to make difficult directions easier to follow
- How to give directions that are clear and specific
- What to do when a child follows a direction
- What to do when a child does not follow a direction

Module 4: How to Use Reinforcement

- How to use praise effectively
- Rewarding small steps
- Natural reinforcement
- Selecting reinforcers

Module 1: The ABC's of Behavior

- Definition of behavior
- Discrimination between words that describe feelings and words that describe behaviors
- Identification of examples of learned behaviors
- Defining and identifying examples of antecedents, behaviors, and consequences

Module 3: Introduction to Reinforcement

- Definition of reinforcement
- Kinds of reinforcement
- Individual differences in what is reinforcing
- When and how to reinforce
- Importance of "catching a child being good"

Module 5: Planning Activities to Increase Desired Behaviors

- Planning activities that are enjoyable and appropriate
- Anticipating problems
- Controlling materials
- Scheduling activities
- Establishing reinforcement plans, rules, and consequences

(continued)

Appendix A (continued)

Module 6: Responding to Undesirable Behaviors

- Why children continue undesirable behaviors
- Ways to respond to undesirable behaviors
- Deciding which strategy to use

Module 8: Teaching New Skills

- Types of assistance
- Using assistance to teach new skills
- Choosing easy materials and settings
- Getting a child interested in learning a new skill

Module 10: Keeping Track of Behavior

- Why it is important to keep track of behavior
- Creating and evaluating a plan for change
- Ways to keep track of behavior
- Deciding how and when to keep track of behavior

Module 7: Deciding What to Teach

- Deciding what to teach your child
- Breaking the skill down into easy-to-learn steps
- Getting ready to teach the new skill

Module 9: Encouraging Communication

- How children communicate
- Why children communicate
- Strategies for encouraging communication
- Environmental strategies
- Incidental teaching

Module 11: Monitoring Group Instruction

- Why monitoring procedures are important
- How to monitor group instruction
- How to cue the teacher
- Behaviors that cannot be ignored

Positive Parenting Practices for Young Children With Autism

Module 1: The ABC's of Behavior

- Definition of behavior
- Discrimination between words that describe feelings and words that describe behaviors
- Identification of examples of learned behaviors
- Defining and identifying examples of antecedents, behaviors, and consequences

Module 3: Introduction to Reinforcement

- Definition of reinforcement
- Kinds of reinforcement
- Individual differences in what is reinforcing
- When and how to reinforce
- Importance of "catching a child being good"

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Module 8: Teaching New Skills

- Types of assistance
- Using assistance to teach new skills
- Choosing easy materials and settings
- Getting your child interested in learning a new skill

Nurturing Social Skills in the Inclusive Classroom

- | | |
|--|---|
| <ul style="list-style-type: none"> • The Need for Social Skills • Strategies for Promoting Social Interactions • Prompting and Reinforcing Social Interactions • Play Activities for Promoting Social Interactions | <ul style="list-style-type: none"> • Peer-Mediated Strategies: The Social Skills Curriculum • Creating the Social Skills Posters • Social Systems • Embedding Social Interactions Into Daily Routines |
|--|---|
-

Training/Consultation Process—Description for Training Sites

As each site is unique, it is hard to outline exactly what the consultation/training process will look like. It is an individual process with each site having their own strengths and needs. However, based on the cumulative knowledge and experience of the LEAP team, we have outlined some important aspects of the process and how they might be realized for your site.

- The number of site visits will be determined collaboratively between your LEAP consultant and the Classroom team.
 - Ideally sites should expect around 3 to 6 consultation visits in the first year of implementation (with the possibility of more visits coming at the beginning of the school year and fewer later in the school).
 - Our role in the classroom can take many forms depending on what best suits your team's learning style and the situation. All LEAP consultants have extensive experience working with children and children with special needs, and working in preschool classrooms and utilizing LEAP strategies, procedures, and routines. Roles can include:
 - Observing the classroom team and providing verbal and written feedback.
 - Modeling teaching and classroom procedures hands-on with children, with classroom team members observing.
 - Assisting in the development of classroom props and materials.
 - Assisting with curriculum adaptations and modifications.
 - Attending home visits with classroom team members.
 - Leading Parent Skill Training meetings.
 - Planning Meetings: In the past, we have learned that planning meetings are an integral part of the consultation process. These meetings can take several forms from informal chats about how an activity or a day went, to formal meetings around prioritizing, planning, training, and progress.
 - Planning meetings are recommended as part of each site visit as they provide an opportunity to review/discuss what has happened during the course of the visit including:
 - New classroom strategies and activities
 - New teaching strategies
 - Child progress
 - Adaptations and modifications
 - Successes and challenges
 - Prioritizing next steps
 - Whenever possible all contributing team members should attend these meetings. While we understand many team members have a variety of roles and responsibilities, team planning time is a necessity for successful training to occur.
 - We have also found that when these meetings can be attended, at least in part, by district and school administrators, they are better able to stay abreast of how the training is progressing and provide greater support to the classroom team.
 - Follow up
 - After each site visit (within a couple working days), the classroom team will receive a Consultation Feedback Form outlining *general classroom observations, suggested teaching/environmental/team strategies, and individual child-related strategies and suggestions*. This will likely be a summary of information discussed during the planning meeting held during the visit and will be used as a record of the consultation process as a whole.
-

Appendix B

LEAP Quality Program Indicators

Classroom Organization and Planning

KEY: 5 = Full Implementation, 3 = Partial Implementation, 1 = Needs Work

1. Organizes and maintains classroom in an attractive manner.	5	4	3	2	1
<ul style="list-style-type: none"> • maintains a stimulating and orderly environment • Sets up and maintains individual interest areas (i.e., sensory table, art, blocks, etc.) • Displays children's art work • Reduces or removes distracting stimuli when necessary 					
2. Maintains an organized daily schedule	5	4	3	2	1
<ul style="list-style-type: none"> • ensures that daily routine follows an orderly and predictable sequence • provides a balance of activities (active/quiet, teacher directed/child directed, and individual/small group/large group) • considers attention span and abilities of children when planning an activity • posts classroom schedule in an area visible to staff, parents, and outside visitors • follows schedule in a predictable manner but allows for flexibility • prepares for transitions; follows transition sequence consistently; supports children as needed and provides children with sufficient notice that a transition is coming 					
3. Arranges the environment and daily routines to support independence	5	4	3	2	1
<ul style="list-style-type: none"> • places materials on low shelves making them readily accessible to children • labels shelves with pictures of materials to support independent clean up • establishes a system for children to choose and transition between play areas (name tags, necklaces, clothes pins, etc.) • creates a predictable sequence within the daily activities (i.e., circle time includes, "Hello song," calendar, weather, introduction of themes, and choosing play areas) 					
4. Plans easily recognizable unit themes	5	4	3	2	1
<ul style="list-style-type: none"> • Selects themes that reflect children's interests and abilities • Creatively incorporates and embeds themes into play areas • Brings materials related to the theme into the classroom 					
5. Encourages teamwork	5	4	3	2	1
<ul style="list-style-type: none"> • team meets as a whole to plan themes and activities (regular ed and special ed) together • encourages exchange of ideas, sharing observations, and discussion of new strategies • delineates roles and responsibilities to ensure smooth flow of daily routine • plans for all staff members to share in classroom responsibilities • communicates information regarding child needs, interests, and programming goals with all staff members 					

Comments

Teaching Strategies

KEY: 5 = Full Implementation, 3 = Partial Implementation, 1 = Needs Work

1. Individualizes instruction based on children's needs, interests, and abilities	5	4	3	2	1
<ul style="list-style-type: none"> • individualizes children's needs, interests, and abilities • plans for varying levels of development in classroom activities • targets functional goals and objectives for children • follows children's lead by responding to ongoing play and initiations to increase and improve quality of engagement 					
2. Implements naturalistic teaching strategies for addressing children's needs	5	4	3	2	1
<ul style="list-style-type: none"> • embeds instruction into naturally occurring opportunities for learning (i.e., circle, play, transitions, interactions, meals, etc.) • addresses related skills in conjunction with target goal (i.e., works on language, social and fine motor skills while practicing set the snack table) • provides opportunities for children to practice skills across settings, materials, cues, and people (generalization) 					

(continued)

Appendix B (continued)

3. Identifies logically occurring antecedents and consequences	5	4	3	2	1
<ul style="list-style-type: none"> ensures that antecedents are selected to elicit targeted skills gives instructional feedback that is immediate, specific and objective provides adequate environmental cues for acquiring and maintaining desired responses selects consequences inherent to the activity or a logical outcome of the activity assumes an active role in the classroom 					
4. Adapts instruction to meet children's special needs	5	4	3	2	1
<ul style="list-style-type: none"> incorporates learning objectives into child-selected activities and routines provides instruction through children's most effective learning mode plans for repetition, modeling and imitation to assist in skill uses a consistent hierarchy of prompts; systematically fades the prompt uses task analysis (breaks tasks down into smaller steps) for teaching purposes intersperses "known" material with "unknown" material 					
5. Adapts materials to meet children's special needs	5	4	3	2	1
<ul style="list-style-type: none"> enlarges and/or stabilizes materials for children with visual or motor impairments adds visual cues to materials to help child participate more independently reduces distraction by limiting materials uses reusable materials to provide extra practice makes materials more familiar or more personal for child 					

Comments

Teaching Communication Skills

KEY: 5 = Full Implementation, 3 = Partial Implementation, 1 = Needs Work

1. Utilizes naturalistic teaching strategies	5	4	3	2	1
<ul style="list-style-type: none"> reflects and expands on children's verbal communication playfully encourages communication using environmental strategies engages in parallel and self-talk to model language uses Incidental Teaching effectively across classroom activities 					
2. Identifies and capitalizes on opportunities to encourage communication	5	4	3	2	1
<ul style="list-style-type: none"> sets up play and routine situations that foster communication between children uses highly motivating, novel materials within the classroom develops repetitive and predictable routines then pauses or changes the routine to illicit initiations or commenting allows adequate waiting time for child to process and formulate language 					
3. Utilizes and encourages total communication (signs, pictures, gestures, augmentative communication devices, and verbalizations) within the classroom	5	4	3	2	1
<ul style="list-style-type: none"> integrates individual children's augmentative communication systems into all classroom routines ensures that pictures (or other augmentative devices) are readily available to individual children at all times uses sign or gestures during activities when appropriate ensures peers have opportunities to be exposed to augmentative communication symbols 					
4. Uses a team approach to determine and develop individual communication systems	5	4	3	2	1
<ul style="list-style-type: none"> gives and accepts feedback from other staff participates in team discussions about a child's communication style includes families (actively seeks input from) in decision making and generalization to other settings ensures system is <i>dynamic</i> and constantly changing monitors and incorporates expanding vocabulary quickly 					

Comments

(continued)

Appendix B (continued)

Promoting Social Interactions

KEY: 5 = Full Implementation, 3 = Partial Implementation, 1 = Needs Work

1. Capitalizes on the presence of typically developing peers	5	4	3	2	1
<ul style="list-style-type: none"> • utilizes peers as models of desirable social behavior • encourages peer buddies (i.e., hold hands during transitions, play partner, etc.) • demonstrates sensitivity to peer preferences and personalities • shows an understanding of developmental levels of interactions and play skills 					
2. Utilizes effective environmental arrangements to encourage social interactions	5	4	3	2	1
<ul style="list-style-type: none"> • considers peer placement during classroom activities • effectively selects and arranges <i>activities</i> that promote interactions • effectively selects and arranges <i>materials</i> that promote interactions • plans for consistent social opportunities within classroom routines 					
3. Uses prompting and reinforcement of interactions effectively	5	4	3	2	1
<ul style="list-style-type: none"> • provides sincere, enthusiastic feedback to promote and maintain social interactions • waits until interactions are finished before reinforcing; does not interrupt interactions • models phrases children can use to initiate and continue interactions • gives general reminders to "play with your friends" • ensures that interactions are mostly child-directed not teacher-directed during free play 					
4. Provides instruction to aid in the development of social skills	5	4	3	2	1
<ul style="list-style-type: none"> • Includes social interaction goals on the IEP • Teaches appropriate social skills through lessons and role-playing opportunities • Incorporates cooperative games, lessons, stories, and activities that promote altruistic behavior into planning 					
5. Structures activities to encourage and teach:	5	4	3	2	1
<ul style="list-style-type: none"> • sharing • turn-taking • requesting and distributing items • working cooperatively 					
6. Utilizes materials that are:	5	4	3	2	1
<ul style="list-style-type: none"> • high interest • novel • high in social value 					

Comments

Providing Positive Behavioral Guidance

KEY: 5 = Full Implementation, 3 = Partial Implementation, 1 = Needs Work

1. Creates an environment that leads to the development of self-control	5	4	3	2	1
<ul style="list-style-type: none"> • tries to avoid behavior problems by being organized and prepared • redirects disruptive/destructive play into acceptable outlets • guides children in effective ways of settling disputes • encourages children to talk about their feelings and ideas rather than use physical force • tells children what they can do, gives alternatives 					
2. Establishes/enforces clear rules, limits, and consequences for behavior	5	4	3	2	1
<ul style="list-style-type: none"> • identifies/reviews classroom rules with children; provides opportunity for practice • states rules positively and specifically (avoids "no" and "don't" as much as possible) • keeps rule to manageable number (3-6) • frequently reinforces children for appropriate behavior • Identifies consequences for both following and not following rules • Makes sure all adults in classroom know rules and consequences 					

(continued)

Appendix B (continued)

3. Gives appropriate directions	5	4	3	2	1
<ul style="list-style-type: none"> • keeps directions simple, short, and specific • phrases directions as statements when choice is not an option • states directions in calm, quiet, neutral tone; • uses preventive directions to head off potential problems • uses a hierarchy of prompts for following directions 					
4. Utilizes monitoring strategies to reduce behavior problems	5	4	3	2	1
<ul style="list-style-type: none"> • assists children to attend to teacher in group activities • helps cue teacher when children need attention, acknowledgment of efforts, opportunity for turns, etc. • positions self to allow clear view of play areas; shares monitoring responsibilities with other staff members • remains focused on children; is careful not to become distracted 					
5. Implements a variety of effective behavior management strategies	5	4	3	2	1
<ul style="list-style-type: none"> • utilizes a systematic approach for developing behavior interventions • includes a high level of positive reinforcement—4:1 ratio • utilizes peer models to increase appropriate behavior • uses interruption and redirection to teach desirable alternative behavior • ignores attention-seeking behaviors when appropriate 					

Comments

IEP's and Measuring Progress (Data Collection)

KEY: 5 = Full Implementation, 3 = Partial Implementation, 1 = Needs Work

1. Establishes a system for effective data collection	5	4	3	2	1
<ul style="list-style-type: none"> • selects type of data sheet based on IEP objective • organizes manageable system where data sheets are easily accessible to staff • assures each goal and data sheet includes the objective, level of performance, criteria, and specially designed instructions if appropriate • all staff accept responsibility for collecting data as delineated on a posted schedule 					
2. Incorporates data collection into daily routine	5	4	3	2	1
<ul style="list-style-type: none"> • Assess daily lesson plans and considers where and when certain data can be collected • Ensures each child has some goals or objectives coded per day 					
3. Reviews and maintains data in systematic fashion	5	4	3	2	1
<ul style="list-style-type: none"> • Monitors data to make changes as appropriate • Checks data frequently for goals completion according to criteria • Adds new goals and data sheets as necessary • Reviews data with team and supervisor on regular basis 					
4. Evaluates goals and objectives for appropriateness in the environment	5	4	3	2	1
<ul style="list-style-type: none"> • reviews each child's goals and objectives upon entry into program • Spends 3–4 weeks getting to know child and determining appropriate objectives and collect baseline data • Conducts a team meeting where members share ideas about appropriate goals/ objectives 					

Comments

Interactions With Children

KEY: 5 = Full Implementation, 3 = Partial Implementation, 1 = Needs Work

1. Develops meaningful relationships with children	5	4	3	2	1
<ul style="list-style-type: none"> • greets children on arrival; calls by name • communicates with children at eye level • verbally interacts with individual children during routines and activities • participates in children's play when appropriate • shows respect, consideration, warmth and speaks calmly to children 					

(continued)

Appendix B (continued)

2. Interacts with children to develop their self-esteem	5	4	3	2	1
<ul style="list-style-type: none"> • demonstrates active listening with children • avoids judgmental statements • supports children's ideas • recognizes children's efforts 					
shows empathy and acceptance of children's feelings					
3. Shows sensitivity to individual children's needs	5	4	3	2	1
<ul style="list-style-type: none"> • respects and accommodates individual needs, personalities, and characteristics of all children • adapts and adjusts accordingly; plans for different skill levels • conveys acceptance of individual differences (culture, gender, and sensory needs) through diverse planning, material selection, discussion topics 					
4. Encourages autonomy	5	4	3	2	1
<ul style="list-style-type: none"> • provides children with opportunities to make choices • allows children time to respond and/or complete task independently before offering assistance • creates opportunities for decision making, problem solving, and working together • teaches children strategies for self-regulating and/or self-monitoring behaviors 					
Comments					

Interactions With Families

KEY: 5 = Full Implementation, 3 = Partial Implementation, 1 = Needs Work

1. Creates an environment for open communication and mutual trust	5	4	3	2	1
<ul style="list-style-type: none"> • greets family members by name • creates opportunity for brief, informal communication at arrival and departure • responds to parent conversation; parents are comfortable approaching staff • establishes a system for regular communication with parents • responds to notes, phone calls, etc., in a timely manner 					
2. Provides parents with clear information so that they understand the philosophy of the program and the strategies being used with their child	5	4	3	2	1
<ul style="list-style-type: none"> • avoids jargon and acronyms; technical terms are explained • considers differences in culture, values, expectations, and levels of understanding • sets up opportunities for parents to observe staff and model strategies • shares information regarding teaching strategies with parents 					
3. Speaks in a respectful manner when discussing family issues with other staff members	5	4	3	2	1
<ul style="list-style-type: none"> • understands that situations cannot always be handled in the home • respects family members different methods of coping • views parents as the expert on their child, avoids patronizing language and tone • respects the family's right to confidentiality 					
4. Involves parents in classroom activities	5	4	3	2	1
<ul style="list-style-type: none"> • posts weekly lesson plans and other pertinent information for parents • involves families in a variety of ways • gives parents ideas for carrying over themes or activities to home • provides families who cannot regularly visit with other opportunities to contribute • considers parents as a source for ideas, materials, and support for classroom activities • communicates roles and responsibilities to parents when they volunteer • plans activities during the school year that involve extended family members 					
5. Treats parents as a member of their child's educational	5	4	3	2	1
<ul style="list-style-type: none"> • invites parents to meetings regarding important programming decisions • shares relevant, important information with parents • asks parents for their ideas, opinions, and guidance • involves parents in the development and evaluation of classroom goals 					

Comments

Appendix C

LEAP—USA Scale of Intervention Compatibility

Directions—Please complete the following survey. For each intervention component rate your impressions of its compatibility with your program or effectiveness in comparison to previous years. Please rate the component using the 1 to 5 scale provided.

1. Applied	Training Objectives are Not of Interest 1 2	Training Objectives are of Some Interest 3 4	Training Objectives are of Great Interest 5
2. Effective	Training Produced No Behavior Change 1 2	Training Produced Some Behavior Change 3 4	Training Produced Large Behavior Change 5
3. Flexible	Training was Rigid, Not Individualized 1 2	Training was Somewhat Individualized 3 4	Training was Individualized and Encouraged Creativity 5
4. Generalizable	Training Produced No Effect Across Situations and Time 1 2	Training Produced Some Effect Across Situations and Time 3 4	Training Produced Broad-Based Effects Across Situations and Time 5
5. Inexpensive	Investment of Time, Money, and Materials was Too Great 1 2	Investment of Time, Money, and Materials was a Mild Concern 3 4	Investment of Time, Money, and Materials was Low 5
6. Practical	Training Resulted in No Time Savings 1 2	Training Resulted in Moderate Time Savings 3 4	Training Resulted in Large Time Savings 5
7. Simple	Training Demands Were Too Complex 1 2	Training Demands Were Manageable 3 4	Training Demands Were Easy to Meet 5
8. Socially Acceptable	Strategies Presented Were Not Acceptable 1 2	Strategies Presented Were Somewhat Acceptable 3 4	Strategies Presented Were Very Acceptable 5
9. Sustainability	Skills Learned Cannot Be Maintained 1 2	Skills Learned Can Be Maintained With Some Support 3 4	Skills Learned Can Be Self-Sustained 5
10. Technology	Skills Learned Are Not Detailed Enough to Allow For Future Training 1 2	Skills Learned Can Be Taught to Others With Some Support 3 4	Skills Learned Can Be Readily Taught to Others 5
11. Community / Inclusion	Strategies Restricted Development of Community/ Inclusion 1 2	Strategies had no Impact on Community/ Inclusion 3 4	Strategies Facilitated Improved Community/ Inclusion 5
12. Social Relations	Strategies Produced no Change in Children's Meaningful Social Relationships 1 2	Strategies Produced Some Improvements in Children's Meaningful Social Relationships 3 4	Strategies Produced Considerable Improvements in Children's Meaningful Social Relationships 5
13. General Progress	Strategies Reduced Child Progress/ Outcomes from Previous Years 1 2	Strategies Produced Child Progress/ Outcomes Similar to Previous Years 3 4	Child Progress/ Outcomes Greater than Previous Years 5
14. Problem Behavior	Staff Response to Problem Behavior is Less Effective than Previous Years 1 2	Staff Response to Problem Behavior is As Effective as Previous Years 3 4	Staff Response to Problem Behavior is More Effective than Previous Years 5

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