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An Incidental Teaching Approach to Early Intervention for Toddlers with Autism

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In an effort to move incidental teaching research to practical applications for toddlers with autism, a comprehensive early intervention model was developed for use in the natural environments of a childcare center and children's homes. Based on the premise that social readiness will best be achieved by providing early social learning opportunities, the center based component of the model targets the developmental needs of an inclusive group of children with and without autism. The home based component involves parents of children with autism as key participants in their children's learning and prepares them to be effective advocates in their children's futures. The curriculum addresses what it is that toddlers need to learn, what environmental arrangements provide the most powerful teaching opportunities, and how teachers and parents can most effectively teach children to progress at their optimum pace. Outcome data are presented that documents an impact on the language and social behavior of participating toddlers with autism. Two of the more controversial Walden curriculum components are discussed. Current impediments to system change are considered in the hope that appropriate and effective early intervention may become available to all children with autism.

DESCRIPTORS: autism, early intervention, incidental teaching, Walden toddler program

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Due to the severity of autism in the absence of systematic intervention, the issue is not whether to intervene, but how to provide intervention when it will help the most. Given widespread controversy in many issues pertaining to autism, strong consensus exists on this one point: early intervention is a critical factor in effective treatment (Rapin, 1997; Strain, Wolery, & Izeman, 1998).

In contrast to a relatively recent past in which institutional care was the primary treatment modality, intensive early intervention is making it possible for growing numbers of children to function at or near typical levels of development in many domains (Anderson, Avery, DiPietro, Edwards, & Christian, 1987; Fenske, Zalenski, Krantz, & McClannahan, 1985; Greenspan & Wieder, 1998; Harris, Handleman, Kristoff, Bass, & Gordon, 1990; Lovaas, 1987; McGee, Morrier, & Daly, in press; Strain, Hoyson, & Jamieson, 1985). The key common elements of programs documenting positive effects are that they are *hours intensive*, they are provided by *highly trained staff*, they *actively involve parents*, and they all *begin intervention by at least the preschool years* (Dawson & Osterling, 1997; Harris & Handleman, 1994).

Early intervention for children with autism is not just a matter of extending the length of intervention for a longer period. Rather, when children with autism are very young, it is possible to make qualitative improvements that cannot be accomplished later (McGee, 1988). However, until recently, most approaches to early intervention of autism have been implemented in preschool settings. Few intervention approaches have been aimed specifically at meeting the needs of toddlers. Improvements in early diagnosis, the advent of child find initiatives, and the nationwide development of early intervention systems serving children aged birth to three have created a timely opportunity to begin intervention at the earliest possible age—the toddler years.

In this article, a brief description of the Walden Toddler Program will be followed by a review of the empirical and philosophical foundations that comprise the bottom lines of the incidental teaching toddler model. Next, key components of the model's incidental teach-

ing curriculum will be highlighted. Preliminary outcome data on participating children will also be reported, along with discussion of practice and policy issues that arise in providing intensive early autism intervention.

Overview of the Walden Toddler Program

The Walden Toddler Model was developed and evaluated with support from a U.S. Department of Education (Office of Special Education Programs) model demonstration grant. Following 10 months of curriculum preparation, needs assessments, and model development, the toddler program opened in July 1993. The Walden Toddler Program provides more than 30 hours per week of planned early intervention through a combination of home and center based components. A comprehensive incidental teaching approach is used to blend systematic instruction into children's family routines at home and in the community, as well as into an enriched early childhood center that includes a majority of typically developing peers.

The Walden Toddler Program is part of a continuum of early intervention provided within the Walden Early Childhood Programs, which includes a preschool and prekindergarten classroom as well as the toddler program. The Walden Programs are a component of the Emory Autism Resource Center, which is part of the Department of Psychiatry and Behavioral Sciences at Emory University School of Medicine.

The Walden Toddler Program is an adaptation of an earlier model developed for daycare of typically developing infants (Herbert-Jackson, O'Brien, Porterfield, & Risley, 1977) and toddlers (O'Brien, Porterfield, Herbert-Jackson, & Risley, 1979). Program components evolved from over a decade of research in staff training, environmental arrangements, and activity choices (Doke & Risley, 1972; Risley & Favell, 1979; Twardosz, Cataldo, & Risley, 1974). However, substantial adaptations were needed to accommodate the needs of toddlers with autism, to address the challenges of social inclusion, and to incorporate more current research on incidental teaching with children with autism. A family program component was also added.

Center Based Program

The center-based program offers a daily morning session (8:30 a.m. to 12:00 p.m.) to 4 children with autism and a daily afternoon session (2:00 p.m. to 5:30 p.m.) to 4 additional children with autism. In recognition of the needs of the community for access to child care for typically developing children, a decision was made to offer full-day placements for the children without disabilities. Eight typically developing children attend full day, including lunch and nap that are provided during the mid-day interval between morning and afternoon sessions. For all enrolled children, the center based program operates 5 days per week for 12 months a year. The classroom operation is detailed later in a description of the incidental teaching curriculum.

Home Based Program

A multifaceted family program is provided for children with autism. A family liaison, who is an experienced teacher in the child's center based program, provides up to 4 hours of intervention demonstration in the home each week. The family liaison models how to implement teaching procedures in the course of regular home living activities. Parents are provided with hands-on training on how to add in-home teaching hours. Parents are asked to commit to investing at least 10 additional hours of home based instruction, which is spread across the week. The goal is to set up a schedule developed collaboratively with the parents for optimal use of the child's time at home. By blending teaching into normal home and community activities, most of the parents provide far more instructional time than the required 10 hour commitment.

Another important aspect of the family program relates to advocacy preparation and establishing parent networks of support. Group parent meetings are held bimonthly to review common teaching issues and to prepare parents for proactive advocacy in their children's futures. The parent seminar series alternates topics of relevance to the families of children with and without autism (e.g., promoting independence in dressing skills) with topics more specific to the needs of families of children with autism (e.g., what is an individualized educational plan?). In addition, social activities such as holiday dinners, summer picnics, and classroom volunteer opportunities (e.g., multicultural family lunch) help to develop friendships among parents of children with and without disabilities.

Program Replication

The Walden Toddler Model has been packaged in detailed curriculum and model manuals. In addition, training sequences have been prepared that enable the staff of other programs to replicate components of the model. To permit replication of the Walden Toddler Program, it was necessary to specify the bottom line principles for both full and partial replications. Further, the key components of the model's incidental teaching curriculum have been specified in a manner that allows for replication of the program in its entirety or for replication of select portions.

The Walden Toddler Program currently has two full replication sites located in Savannah, Georgia, and Auburn, Alabama. They operate virtually identically to the program at Emory, although they are under non-university administrative umbrellas. Partial replication programs have been set up in a California children's hospital and in a public school system in Maryland. There are a mounting number of requests for technical assistance because the model appeals to early interven-

tion providers and the demand for quality autism intervention programs is so widespread.

Hallmarks of the Walden Toddler Model

Walden was developed from a number of bottom line principles derived from research and experience. For programs that are interested in replicating some or all components of the Walden Toddler Model, there must be a commitment to ensuring compatibility of program orientation and practice with the following principles.

1. Early is Essential

If the goal of early intervention is to alter the developmental course of autism, then the social and communication deficits that characterize autism must be addressed when children are as young as possible. It is likely that the neurologic plasticity of the toddler years affords the best opportunity to attempt fundamental, broad based behavioral change (Huttenlocher, 1984). Based on the premise that the most valuable intervention period may turn out to be the toddler years, it is deemed crucial to plan the use of this critical period.

Walden has been designed specifically to meet the needs of toddlers, and children ideally enter between the ages of 15 to 30 months. The curriculum is generally appropriate for children with autism for a full year from the time of program entry, and typically developing children are appropriately challenged until approximately 36 months of age. All Walden replications must serve at least some toddlers with autism.

2. More is Better

The Walden Toddler Model is based on the principle that hours of engaged time are key to children's learning, and more hours of engaged time is better than less. The first controlled early autism intervention study provided a clear demonstration that 40 or more hours of early intervention produced markedly better outcomes than 10 or less hours of the same intervention (Lovaas, 1987). Recent reviews of research based autism intervention programs indicate a range between 20 and 40 hours of intervention per week (Dawson & Osterling, 1997; Harris & Handleman, 1994).

The quality of an early intervention program must be measured not only in number of hours per week of planned intervention, but also in terms of the effectiveness of the program in obtaining child engagement in learning opportunities. Issues of engaged time take on special concern when educating children with autism, because at the onset of treatment they are seldom engaged in productive activity (McGee, Daly, Izeman, Mann, & Risley, 1991). Thus, if a child with autism is engaged with toys, activities, and/or people in the child's environment for only 50% of a 20 hour per week program, then the child is available for learning for only 10 hours per week (T. R. Risley, personal communication, November 3, 1993).

The Walden Toddler Program operates on the assumption that a minimum of 30 hours per week of intervention is needed to reap the benefits of early intervention, and a child must be kept engaged for a minimum of 80% of the time spent in planned intervention. In the Walden Preschool and Pre-Kindergarten classrooms, children receive at least 30 hours per week of classroom instruction, and a planned after school program provides formal promotion of engagement for up to a total of 47.5 hours per week. In all Walden Programs, well prepared family members (including parents, grandparents, siblings, and others) are capable of adding substantially to the number of intervention hours that their child receives each week.

3. Family Involvement is Critical

No program for toddlers could be complete without active involvement of families. Specialized training for families is most conveniently accomplished when children are very young, because parents of all toddlers are constantly with their children for reasons of basic safety. Moreover, parents tend to be most actively involved in teaching their children during the toddler years (cf. Hart & Risley, 1999). By providing parents of very young children with autism with specialized competence in how to promote their child's learning, more intervention time becomes available to the child and more normalized family functioning becomes a long-term reality (McGee, Jacobs, & Regnier, 1993). Further, by educating parents about autism and proactive advocacy on their child's behalf, they may become more discriminating and effective consumers throughout their child's important early childhood years and beyond (Zigler, 1997).

Replications of the Walden Program must provide the family component of the program, including both specialized parent training and advocacy preparation. If parents have the capability of providing the necessary intensity of hours, as well as inclusion with typical peers (i.e., similar aged siblings or neighbors), it may be possible to replicate at least portions of the curriculum without the center based component. However, experience indicates that the center based component should not be implemented in the absence of the home based program.

4. Social Development Requires Early Inclusion

Social engagement must be a first priority for children with autism. The difficulty of impacting children's ongoing social behavior requires that social intervention be intensive and carefully planned. Thus, children with autism and typically developing peers must be directly taught how to interact with one another (McGee, Almeida, Sulzer-Azaroff, & Feldman, 1992). However, the challenge of social intervention is greater than teaching children with autism "how to" interact with their typical peers. Lifelong community participation

requires that children develop a social interest that will support their social growth beyond the early intervention years.

Because the development of normal social behavior cuts right at the core of what defines autism (Fein, Pennington, Markowitz, Braverman, & Waterhouse, 1986; Volkmar, Carter, Sparrow, & Cicchetti, 1993), such a daunting effort must begin as early as possible. It is during the toddler years that typically developing children make important transitions into the world of social interactions with their peers. By delaying social intervention for toddlers with autism, developmental gaps expand because the early years of child development are characterized by dramatic social growth. Unfortunately, without systematic planned social intervention, most children with autism show little or no progress in peer related social behavior (McGee, Feldman, & Morrier, 1997). Logically, the inclusion of children with disabilities is most easily accomplished when developmental differences are smallest.

Walden maintains a ratio of two typically developing peers for every child with autism. Replications of the center based component of the Walden Toddler Program must provide at least a majority of same aged typical peers.

5. Early Childhood Should be Fun

The design of a curriculum for toddlers was positively influenced by societal expectations regarding the care of young children. Although there are few who would argue that aversive treatments are appropriate for very young children with or without autism, some special education programs incorporate unplanned restrictive procedures. For example, it is not uncommon in programs for children with disabilities to find the practice of using seat belts to restrict children's movement. Further, although some proponents of discrete trial behavioral interventions are reluctant to begin intensive rote trial drills when children are below the age of 3 (Anderson, 1994), others have advocated for beginning intervention with infants confined to their high chairs (Green, Brennen, & Fein, 1997).

Teaching in the course of children's ongoing play activities is a traditional early childhood approach to ensuring that children enjoy and cooperate with instruction (Brendekamp & Coople, 1997; Bricker & Cripe, 1992). Experience at Walden has demonstrated that it is possible to provide systematic behavioral intervention while children enjoy their early childhood years, by blending positive and naturalistic teaching procedures into a developmentally appropriate early childhood curriculum.

Replications of the Walden Toddler Model must commit to a preventive approach to dealing with behavioral challenges, which may be presented by the children without disabilities as well as by children with autism (McGee & Daly 1999b). When problems do arise, intervention must be in the form of positive behavioral support (Dunlap, Johnson, & Robbins, 1990). In short, Walden replications must explicitly agree to a prohibition on use of aversive or overly restrictive procedures.

6. Incidental Teaching Should be Planned

Incidental teaching offers the advantages of a technical grounding in applied behavior analysis (ABA), with the added benefit that accrues from delivering intervention in the context of regular early childhood activities (McGee, Daly, & Jacobs, 1994). Incidental teaching is a systematic protocol of instruction that is delivered in the context of the natural stimulus conditions of everyday environments (Hart & Risley, 1968, 1974, 1975). Specifically, incidental teaching requires that the environment be arranged to attract children to desired toys and activities. Children initiate incidental teaching episodes by gesturing or requesting a desired item or event, and the teacher prompts them for an elaboration in their initiation. Finally, they are given access to desired toys or activities contingent on producing an elaborated response.

Teaching in the course of ongoing activities in natural environmental settings is a marked departure from traditional behavioral methods of educating children with autism. Specifically, discrete trial procedures have usually consisted of rote drill instruction that occur in distraction free settings (Lovaas et al., 1981). Discrete trials are teacher directed rather than child initiated, and there is usually no relationship between the response and the reward for correct responses.

Critics have sometimes suggested that incidental teaching is "applied behavior analysis in sheep's clothing." There is some truth in this characterization. The same principles of learning underlie both incidental teaching and discrete trial training formats. Thus, precision in the delivery of reinforcement, stimulus presentation that promotes errorless learning, and various other advances in discrimination training apply equally well to incidental teaching and discrete trial training procedures. The impetus for incidental teaching with children with autism was not a rejection of discrete trial training formats. Rather, the interest in incidental teaching was prompted by the need to overcome the generalization problems that continued following traditional behavioral interventions (McGee, Krantz, Mason, & McClannahan, 1983).

In other words, children with autism do learn to speak with highly structured discrete trial instruction. However, research has shown that children are better able to transfer their language to new settings and people following instruction with incidental teaching (McGee, Krantz, & McClannahan, 1985, 1986). For example, children who learned some prepositions with discrete trial instruction, and other prepositions with incidental teaching, were shown to be able to use lan-

guage learned through incidental teaching with different adults, in different settings, and to describe the location of toys that were not associated with initial teaching. However, these same children could use the prepositions learned through discrete trial instruction only in the contexts that corresponded to the initial teaching situation.

Walden was developed on the premise that goals of achieving meaningful outcomes are best obtained by teaching in the context of naturally occurring stimuli. There is an efficiency advantage in using procedures that promote generalization of skills simultaneous with initial skill acquisition. In addition, procedural requirements of incidental teaching promote social initiations and skills in making choices, because children's initiations are consistently rewarded in every teaching episode (McGee et al., 1986). Incidental teaching procedures also generate less cue dependency than more traditional interventions (McGee et al., 1985). Importantly, incidental teaching dictates that careful attention be paid to children's preferences in the selection of classroom toys and activities, which serve as both the instructional materials and reinforcement for correct responses (Mason, McGee, Farmer-Dougan, & Risley, 1989).

A practical advantage of a comprehensive incidental teaching curriculum is that it meets the needs of an inclusive group of toddlers with and without autism, because the procedures were originally developed for use with preschoolers without disabilities (Hart & Risley, 1968, 1974, 1975). Additionally, parents and other caregivers are able to teach continuously without disrupting their normal family routines (McGee et al., 1993). Perhaps the most appealing advantage is that a well planned incidental teaching curriculum makes it possible for young children with autism to receive intensive intervention while engaging in age appropriate play activities.

In sum, our aim has been to help children with autism achieve fundamental changes toward social normalization by extending an incidental teaching approach to early autism intervention downward to the toddler years. In either partial or complete replications of the Walden Toddler Model, the hallmarks of the model must be fully in place. Thus, there must be at least some toddlers with autism, a minimum of 30 hours of planned intervention, a family program component, a majority of peers without disabilities, an absence of either planned or inadvertent aversive procedures, and at least some use of incidental teaching procedures.

Development of a Comprehensive Incidental Teaching Curriculum for Toddlers

There are only so many waking hours in the life of a very young child. To use the early hours of children with autism to maximum advantage, the Walden environment has been engineered in a way that blends the need for systematic instruction with the need for normalized environmental stimulation.

The project has taken a systematic approach to the development of a curriculum to support learning by toddlers with and without autism. The term curriculum was broadly defined to address the goals, environmental contexts and instructional materials, and the teaching procedures that would produce maximum developmental progress. Specifically, the framework for the Walden Toddler curriculum was built around three central questions: (1) What do toddlers need to learn? (2) What environmental arrangements are most conducive to teaching various skills to toddlers? and (3) What do caregivers need to do to promote learning in toddlers? The incidental teaching curriculum was designed based on current research, which was supplemented by input from an interdisciplinary panel with wide ranging expertise on typical and atypical development.

Each of the following components of the incidental teaching curriculum must be in place to achieve a full replication of the Walden Toddler Program. However, programs wishing to accomplish a partial replication may borrow the components of their choice. Key components of the major curriculum areas are listed in Table 1.

Interdisciplinary Selection of Toddler Goals

Input on the selection of goals was solicited from a specially assembled interdisciplinary team composed of early childhood specialists, developmental psychologists, special educators, a pediatrician and psychiatrist, a speech and language therapist, and autism experts (see Acknowledgements for names of contributors). A

Table 1
Incidental Teaching Curriculum Components

Curriculum areas	Key components
Interdisciplinary selection of toddler goals	Expressive verbal language Engagement with toys Social responsiveness to adults Social tolerance/imitation of peers Independence in daily living
Environmental arrangement	Zone based teacher schedule Goals embedded in natural activities Supplemental one-to-one instruction in natural contexts Child selected teaching materials Systematic display and rotation of toys
Incidental teaching procedures	Vigorous speech shaping Active social instruction Wait-ask-say-show-do Promotion of engagement Checklist based performance appraisals

modified Delphi process was used to structure input from the varied theoretical and experiential perspectives, as follows.

First, information was culled from an open ended questionnaire that queried opinions on developmentally appropriate goals for toddlers. In addition, the questionnaire asked respondents to identify how their answers might differ for typically developing toddlers and those with autism. The team provided convergent opinions in response to questions on differences in curriculum needs between toddlers with and without autism, as well as on major normative developmental accomplishments to be obtained during the toddler years.

Team members were then contacted individually to clarify differing priorities on curriculum goals, general philosophical orientation toward development and learning, and supportive environmental arrangements for toddlers. Finally, a group conference was convened to provide for interactive discussion of suggestions for modification of the first curriculum draft. The ultimate selection of general goals for toddlers with and without autism was based on a combination of interdisciplinary input, available research, and experience in teaching preschool aged children with autism. A brief description of major curriculum goals follows.

Verbal expressive language. The first objective is to teach children without verbal language how to vocalize when they want things, and to provide them access to desired events contingent on their vocalizations. When contingent vocalizations are established, then meaningful word approximations are expanded through vigorous speech shaping and incidental teaching. The process of teaching contingent vocalizations and word approximations can be expedited by pairing the children's existing sounds with their most preferred rewards (e.g., "bu" can be matched with "ball"). Generic requesting words (such as "more") are not taught early on because they tend to limit the child's need to acquire expanded vocabulary.

When a child has obtained at least ten nonprompted word approximations, the process of building routine word combinations begins (e.g., moving from "cracker," to "want cracker," to "I want cracker"). At this point in language instruction, vigorous efforts are launched to rapidly expand the vocabulary of object labels, actions, and descriptors. When the child has become facile at use of brief phrases and sentences, the child is gradually required to include correct use of conjunctions, articles, and pronouns. Finally, conversational language, colloquial phrases, and other "child culture" phrases and gestures are systematically blended into the child's everyday vocabulary (McGee & Daly, 1999a).

Engagement with toys. In order for a toddler to be engaged in meaningful activity for sustained periods of time, the child must be able to play with toys. In other words, play is the normal activity in which a young child is engaged. However, characteristically, children with autism do not begin intervention with functional play skills and toy play must be directly taught (Lifter, Sulzer-Azaroff, Anderson, & Cowdery, 1993). Even as play skills have been learned, effort is needed to ensure that children with autism remain engaged for a minimum of 80% of their time in the toddler center.

Parents usually have little difficulty sustaining engagement during direct teaching interactions with their children, once they have acquired skills in incidental teaching and the use of preferred materials for instruction. However, brief periods of independent engagement may be a home intervention goal, so that a parent becomes able to complete a household chore, answer a phone call, or interact with a sibling or spouse.

Social responsiveness to adults. An initial goal is to teach children to orient toward adults when approached, and to maintain typical levels of eye gaze during interactions with parents and teachers. Although children with autism may not express their affection to parents in traditional ways, the bond is usually present so that social responsiveness to parents is achieved relatively easily through routine incidental teaching interactions. More active intervention is often required to obtain responsiveness to teachers. This is essential for incidental teaching to proceed. Thus, it is impossible to do incidental teaching with a child who is running away. However, when a child has learned to orient toward a teacher, then opportunities are ripe for incidental teaching to occur.

Social tolerance/imitation of peers. The development of reciprocal peer interactions is not a realistic goal for toddlers with autism, because the typical peers are just beginning to interact with other children and do not yet have the social competence to serve as peer tutors. However, from the outset, children with autism can be taught to stay in proximity to other children so that social learning opportunities are constantly available. By maintaining constant proximity to typical peers, children with autism learn to tolerate inadvertent brushes with other children, and at least to refrain from becoming upset when approached by another child. Other important peer related skills that do not require complex language are to learn to watch other children and to do (at least approximately) what other children are doing. When all of these components are in place, the stage is set for peer imitation. By this time, children are nearly always ready for transition to the preschool, where they can benefit from more direct instruction in how to verbally interact with peers.

Independence in daily living. Self-care skills are far easier to teach a child with autism than more complex social and language abilities. Therefore, parents can be encouraged with early success if they watch and contribute to their children's learning of skills in how to wash their hands, put on their shoes, or blow their nose with tissue. Of course, the big task is toilet training,

which can be accomplished by children with autism at the same ages as their typical peers. In fact, unnecessary complications result when toilet training is delayed, because children with autism have a much more difficult time after they have developed a variety of nonfunctional toilet routines.

Environmental Arrangements

Levels of consideration in arranging ideal environments range from deployment of teachers, to specification of activities and classroom schedules, and finally to furniture arrangement and the display of toys. Detailed specifications exist for arranging the Toddler Center. Depending on the goals selected for teaching at home, and the parents' preference for environmental structure, many of the same procedures are adapted for use in children's homes. At a minimum, information on high preference toys for use in teaching is shared between home and center.

Zone based teacher deployment. To ensure child engagement and frequent teaching opportunities, the Toddler Center is organized into three concurrent and overlapping teaching zones (LeLaurin & Risley, 1972). A zone implies more than just a physical area of the center, but also the goal, activity, environmental arrangement, and teaching routine. Daily activities in the center based programs are scheduled in such a way as to deploy teachers to staff the various zones that are open at a given time. Teachers conduct teaching routines that are specific to the goal of each zone.

At any given time, a lead teacher "conducts" the classroom, ensuring that children are encouraged to participate in a variety of teaching zones. The lead teacher also supports the three zone teachers so that their full attention can be constantly focused on the children. An overlapping schedule of zones ensures that children have many choices, and teaching can be continuous because there is no waiting for large group transitions. As a practical matter, the physical separation of teachers prevents the tendency of even the best adult teachers to congregate and chat.

Goals embedded in natural activities. The major toddler goals are assigned to teaching zones at the center, as well as to routine family activities in the child's home. By embedding goals into teaching zones and home schedules, instruction is spread across times of day, across teachers, and across locations within a setting. An example of the Toddler Center schedule is shown in Table 2 and a sample home schedule is illustrated in Table 3.

No more than one, or at most two, learning topics are assigned to each activity zone. Although a good teacher can find ways to teach many skills at a given activity, there have to be enough teaching episodes within and across days for children with autism to learn new skills. If goals have not been prespecified, or if too many goals are attempted for one activity, then even a talented teacher can teach all day to no avail. For example, if children with autism receive 30 teaching episodes on 10 different topics, then they will have had only three opportunities to acquire each new skill. In contrast, if children received 30 teaching episodes on one topic, the probability of acquisition is greatly increased. Haphazard incidental teaching may be sufficient (if not optimal) for typically developing children, but unplanned instruction of any variety is not likely to produce learning in a child with autism.

Once an activity has been designated as a primary zone for teaching a given skill at a specified time each day, then children's individualized objectives can be easily blended into the teacher's agenda. Thus, if morning free-play is designated as a time for teaching play skills, then children with autism may be taught functional use of toys at the same time that typically developing peers are encouraged to elaborate their imaginary play.

Supplemental one-to-one instruction. Although the goal of an incidental teaching environment is to blend teaching into naturally occurring daily activities, there remains a place for one-to-one instruction for children with autism. Specifically, one-to-one instruction is appropriate when it is difficult to ensure that a sufficient number of teaching episodes for a given skill can be blended into the natural environment. For example, if a child with autism is having difficulty learning correct use of pronouns, it may be difficult to designate a classroom activity for teaching this skill because there are no typically developing children who are having this problem. It is sometimes easier to provide a daily 15 minute session of direct practice on a challenging skill, rather than to risk the possibility that the child does not receive enough teaching episodes to achieve mastery.

In the Walden Toddler classroom, children with autism generally receive two or three one-to-one sessions per day. The incidental teaching format is maintained during one-to-one sessions, although there are massed incidental teaching episodes. Thus, the child will be provided with opportunities to initiate to an array of highly preferred toys, and a designated teacher will provide incidental teaching prompts that pertain to the child's interest ("Say give *me* the ball"). The child will then gain access to the ball by responding to the teacher's prompt for an elaboration. To maintain the advantages of teaching in natural environments and to preserve the availability of peer role models, the one-to-one incidental teaching sessions usually occur in the middle of the free-play zone.

Preferred toys provide the fuel for toddler learning. Research and practice in the Walden classrooms have placed a high priority on ways of selecting and displaying toys in a manner that draws the interests of toddlers with and without autism. Each child with autism receives at least a monthly sensory preference assess-

Table 2
Sample Toddler Center Daily Schedule

Time[a]	Lead teacher	Teacher 1	Teacher 2	Teacher 3
8:30 2:00	Arrivals (greetings)	Free play (playskills/engagement; peer proximity)	Arrivals (Independent dressing)	Health check (body parts labels; toileting independence)
8:45 2:15	Lead teach[b]	Special activity (engagement/concepts; peer proximity)	Free-play (playskills/engagement; peer proximity)	Health check (body parts labels; toileting independence)
9:00 2:30	Lead teach	Special activity (engagement/concepts; peer proximity)	One-to-one (increasing vocalizations)	Free-play (playskills/engagement; peer proximity)
9:15 2:45	Assist snack (independence)	Free-play (playskills/engagement; peer proximity)	Snack (verbal requests; peer proximity)	One-to-one (verbal imitation)
9:30 3:00	Assist snack (independence)	One-to-one (Nonechoic language)	Snack (verbal requests; peer proximity)	Free-play (playskills/engagement; peer proximity)
9:45 3:15	Lead transition	Toilet/diaper (independence)	Free-play (playskills/engagement; peer proximity)	Shoes (independent dressing)
10:00 3:30	Safety	One-to-one (increasing vocalizations)	—	Playground (gross motor skills)
10:15 3:45		Safety	Playground (gross motor skills)	One-to-one (two-word combinations)
10:30 4:00	Lead transition	Free-play (vocabulary; peer proximity)	Shoes (independent dressing)	
10:45 4:15	Assist circle (peer observation)		Free-play (vocabulary; peer proximity)	Circle time (peer observation; synchrony)
11:00 4:30	Small group (turn taking; engagement)	One-to-one (verbal imitation)	Toilet/diaper (independent toileting)	Free-play (vocabulary; peer proximity)
11:15 4:45	Lead teach	Free-play (vocabulary; peer proximity)	Table game (turn taking; peer observation)	One-to-one (verbal imitation)
11:30 5:00	Lead teach	Story (attending; peer proximity)	One-to-one (contingent vocalizations)	Free-play (vocabulary; peer proximity)
11:45 5:15	Departures (greetings)	Shoes (independent dressing)	Free-play (vocabulary; peer proximity)	Toilet/diaper (independent toileting)

[a] Times listed on top refer to the morning (8:30 a.m.–12:00 p.m.) session and times listed on bottom refer to the afternoon (2:00–5:30 p.m.) session.
[b] Lead teach indicates a routine of overseeing all classroom zones, in addition to the special assignments noted.
— denotes teacher break period.

ment, which helps identify the attributes of toys that will elicit the child's initiations. Incidental teaching uses toys as both the teaching materials and the reward for practicing new skills. Regardless of theoretical perspective regarding the appropriateness of concrete rewards for typically developing children, the fact is that many children with autism will not give their best effort unless very potent rewards follow the skill we are hoping to increase. Similarly, research has shown that behavior problems are minimized when very potent rewards are available during teaching (Mason et al., 1989).

Systematic display and rotation of toys. Research has also been conducted to devise strategies for displaying and dispensing toys in a manner that maximizes engagement and teaching opportunities (McGee & Daly, 1999b; McGee et al., 1991). Therefore, specialized hobby boxes are put together to store toys that promote sustained engagement, and other highly preferred toys are selected for use in one-to-one instruction (McGee et al., 1991). In addition, the toys displayed in the classroom are systematically rotated to maintain novelty, to promote cooperation, and to permit matching of target goals to activity (e.g., farm toys are put on toy shelves when the targeted vocabulary words are labels of farm animals; McGee & Daly, 1999b).

When the environment is full of toys and activity choices that interest a child, then there are many opportunities for incidental teaching. However, incidental teaching is most effective when there has been careful planning of the interface between the environment and the procedures that the teacher will use to dispense preferred materials.

Table 3
Sample Daily Home Teaching Schedule

Time	Activity	Primary goal(s)	Teacher
2:30–2:45	Outdoor play/swing	Requests	Mother
2:45–3:00	Prepare for snack	Independence in handwashing and toileting	Mother
3:00–3:15	Snack	Requests	Mother
3:15–3:30	Play with blocks	Play skills	Mother
		Sibling proximity	4 yr. old Sister
6:30–6:45	Rough and tumble play	Adult responsivity	Father
		Sibling proximity	Sister
6:45–7:00	Bath time	Expressive vocabulary body parts labels	Father
7:00–7:15	Dress for bed	Independent dressing	Father
		Cooperation	
7:15–7:30	Bedtime story	Receptive vocabulary	Mother

Incidental Teaching Procedures

At Walden, all instruction is blended into the natural context of children's ongoing activities and interests. Although some of the procedures reviewed below are variants of incidental teaching procedures, the basic components of in-context teaching and natural consequences are components of each.

The "how to" of incidental teaching. A teaching episode begins when a child signals the teacher that the time for instruction is at hand by initiating for a toy, activity, or attention. Most often for toddlers, initiations are concrete gestures (pointing or reaching) or brief verbal indications of what they want. As language progresses, the initiations of typically developing children will increasingly be in the form of commenting about an item, asking a question, or showing an accomplishment to the teacher.

Because many children with autism have characteristic deficits in the ability to initiate, Walden teachers are trained in a variety of strategies for encouraging or priming "initiations." Thus, a teacher may market an attractive toy, may gently interrupt the child's play by placing a hand on a toy, or request a turn with a toy and await the child's indication that the child wants the toy. Environmental arrangements also prime initiations. For example, a gate between classroom areas may occasion an initiation to move between areas, and toys that are visible but not accessible (such as on a high shelf) will similarly encourage children's initiations.

When a child initiates, teachers prompt for an elaboration appropriate to the child's developmental level. The prompt must be challenging but not too difficult for the child to succeed. If the response is not correct, the child should be given additional cues and up to three prompts. It is important for children to learn that incidental teaching will nearly always end in success and receipt of an item of interest.

As soon as a child has responded correctly to the teacher's prompt (with or without assistance), the teacher should confirm that response. A confirmation states exactly what the child has done correctly, and is paired with praise. After the confirmation, the teacher provides the child access to the toy or topic of interest. To keep interactions enjoyable, the teacher will play with the child in between teaching episodes. After a brief period of play, the teacher once again waits for the signal that a new "teachable moment" has arrived. An example of an incidental teaching sequence is shown in Table 4.

Vigorous speech shaping. In the interest of promoting maximum language gains, it is essential that there be very frequent episodes aimed at language instruction. Errorless instructional formats are used to promote acquisition of language, in order to minimize frustration and encourage future verbal attempts. Behavioral procedures for shaping successive approximations are similar with either discrete trial or incidental teaching, with the major differences being the child initiation and the nonarbitrary relationship of the response to the reinforcer (Williams, Koegel, & Egel, 1981). Although the use of natural, nonedible reinforcers is viewed as preferable, children with autism often present initially with very few interests. Of utmost importance is the use of the most powerful reinforcers possible. If edible treats are all that a child seems to want, then these will be used at the stage of teaching contingent vocalizations. In other words, the most important language lesson for children is that their "voice" can efficiently serve to get them what they want.

When contingent vocalizations are established, it is important to move quickly to pairing the child's existing speech sounds with highly preferred objects. At Walden, a couple of discriminated sounds are usually taught simultaneously. As soon as acquisition occurs, the child is quickly shifted to new word approximations (while continuing to practice the previously acquired sounds). In short, clinical judgement is required to prevent a child from overgeneralizing the use of one sound to multiple objects.

Shaping requirements remain fairly loose until children are consistently verbalizing their needs. At that time, the existing words are required to be stated with some (although not perfect) clarity. The overriding assumption is that practice in speaking will improve most

Table 4
Example of Incidental Teaching With a Child With Autism

Child: (Playing with toy cars on "race track" made of blocks)
Teacher: (Gets at child's eye level and watches his play)
Child: (Continues playing)
Teacher: "Billy, you car is really fast." (Waits 5 sec)
Child: (No response or indication that he has heard the teacher)
Teacher: (Gently takes the car and pushes it on the track in front of Billy. Waits 5 sec)
Child: (Reaches for the car)
Teacher: "What color is your car?"
Child: (Looks puzzled)
Teacher: "This car is r . . .".
Child: "red"
Teacher: "Perfect answer! It is a red car." (Gives Billy the car and helps him build a new bridge to drive over with his car.)

articulation difficulties. It is essential that early language attempts not be punished by requirements that are too strict. However, there is constant yet gradual encouragement to expand the length and complexity of utterances.

Most speech can be systematically shaped in the context of naturally occurring toddler center activities. Thus, snack is a powerful time for shaping requests of varying degrees of complexity. Specially targeted vocabulary words are taught in a daily free-play zone that contains toys that provide opportunities to learn targeted words. Body parts are taught during diaper changing or toilet times. However, any speech or language steps that appear challenging for a toddler with autism are shifted to one-to-one instruction as a safeguard that there are sufficient opportunities for acquisition to occur.

Active social instruction. At toddler ages, children with autism are easily encouraged to play near typically developing children. Thus, a toddler can be picked up and settled down with favorite toys that are located near typically developing peers, or toys of interest to typically developing peers can be placed near children with autism. Isolated play is simply not an option, in the classroom or on the playground.

When children have become accustomed to staying near other children, teachers begin to encourage them to play in the same or similar activities as their peers. Research at Walden demonstrated that children are more likely to receive social approaches from other children if they are engaged in similar activities (McGee & Paradis, 1996). Classroom games are used to encourage children to watch other children, and to imitate at least the gross motor actions of their peers.

All the children in Toddler Center must learn how to share, or at least learn not to be aggressive (as in biting) to obtain toys they want. Walden employs a 2 minute sharing rule that toddlers quickly learn; the rule grants a child with the toy the option of playing with it for the next 2 minutes before having to relinquish it to the child who wishes to play with it. Some degree of accommodation is used in recognition that toddlers may have difficulty in sharing a very high preference toy. Thus, rather than endure great upset and fighting over especially popular toys, duplicates are made available as necessary.

Wait-ask-say-show-do. A backward chaining faded guidance procedure is used to promote independence in daily living skills. The format is a straightforward sequence of prompts, interspersed with a 5 sec intertrial interval that provides an opportunity to perform independently, receive praise, and move on with the routine. At the *Wait* prompt, the teacher simply takes the child to the area where environmental cues will be evident (e.g., the child's shoes are laid out in front of his cubby). If there is no response within 5 sec, the teacher will *Ask* the child a generic question such as, "What do you need to do?" Following 5 sec of no response, the teacher will *Say* what is expected in the form of a simple direction, "Put on your shoes." A gesture may then be added to *Show* or direct the child's attention to the shoes. If the direction is not followed within time limits, the teacher moves to the *Do* prompt, using gentle physical guidance to help the child put on the shoes. At any level that the child completes the designated task, the child is provided with praise and access to a preferred activity (e.g., "Big boys who put on their shoes can go to the playground!"). This procedure is a modification of the Ask-Say-Do format used in the initial Toddler Center (O'Brien et al., 1979). However, many toddlers with autism have been found to benefit from the systematic addition of a gestured cue. The initial delay was added to remind teachers to provide the opportunity for task completion prior to giving directions.

Promotion of engagement. Careful attention to the selection, display, and rotation of toys is the primary means of securing child engagement. However, instruction in engagement is also constant throughout the day, in all activities. When a child is not engaged in meaningful activity, the free-play zone manager redirects the child to a classroom toy. If this effort is unsuccessful in securing the child's engagement, the teacher makes a second attempt to help the child find a classroom toy that will be of interest. If a third attempt is needed to secure the child's engagement, the free-play manager brings down the child's hobby box, which contains toys that were preselected based on prior observations of the child's sustained toy play. Additional detail on means of securing and maintaining engagement in the Walden Preschool have been previously reported, and identical systems are in place in the toddler center (McGee & Daly, 1999b; McGee et al., 1991).

Checklist based staff training procedures. A network of training and supervisory procedures ensures that the Walden Toddler curriculum is implemented with consistency. At any given time, a lead teacher and three

other teachers are present during each classroom session.

Lead teachers are responsible for keeping the classroom schedule running according to plan, as well as direct instruction with the children. However, the major job of the lead teacher is to provide ongoing training and feedback to the zone teachers and to keep staff morale high. Hands-on training consists of checklist based performance appraisals that were developed for each teaching zone/routine (McGee, Daly, & Jacobs, 1994). Lead teachers complete a minimum of two checklists per day, rotating across teachers and times of the day. They also make sure that child progress is being tracked through a system of classroom assessment probes.

Special attention has been devoted to the preparation of family liaisons, so that they can support and assist parents in implementing the home based component of the program. The initial training sequence includes role-play and videotaped self-evaluation, didactic presentations on professionalism, performance based checklist feedback, and modeling by the clinical coordinator. Finally, inservice training materials, including videotape examples, have been packaged for use in ongoing refinement of skills. The clinical coordinator occasionally attends home sessions with the family liaisons, in order to provide supervision and to maintain direct contact with the parents.

Child Outcomes

Description of Participating Children With Autism

A total of 28 children with autism participated in the Walden Toddler Program at Emory for at least 6 months, which was the criteria established for including a child in this program evaluation. The average age at program entry was 2 years, 5 months and average age at the time of exit from the toddler program was 3 years, 5 months. Children with special needs were eligible for program entry if an experienced physician or psychologist had given them a diagnosis of autism, autism spectrum disorder, or pervasive developmental disorder—not otherwise specified. Diagnostic confirmation was achieved through child observation and standardized autism assessments, including the Autism Diagnostic Interview (Lord, Rutter, & LeCouteur, 1994), the Autism Diagnostic Observation Schedule (Lord, Rutter, & DiLavore, 1996), and the Childhood Autism Rating Scale (Schopler, Reichler, & Renner, 1986).

Children with autism were accepted regardless of intellectual and developmental functioning. For reasons of safety, children were required to be ambulatory to participate in the program (a requirement that has seldom delayed entry to Walden). The participants were a diverse group of children with and without autism, including 38% who were from minority backgrounds and 31% who qualified for scholarships based on economic need.

To permit objective evaluation of the benefits of beginning intervention when children are as young as possible, priority for admission to the Toddler Program has been given to the youngest child on the waiting list. However, openings for older children sometimes occur in the preschool or pre-kindergarten. The Emory Autism Resource Center offers a variant of the home based component of the program to children of all ages.

Measures

The overall project evaluation included multiple measures of child outcomes, parent outcomes, and consumer satisfaction. A report is in preparation that describes the progress of a matched group of children who participated at Walden before and after the addition of the Toddler Program. However, for this report, preliminary data for two child outcome measures are reported: children's language and social behavior during ongoing activities at the Toddler Center.

Verbalizations included children's distribution of spoken dictionary listed words across their time in the center. Thus, the data provide an estimate of how much of the time a child spends talking. It is a conservative measure because it has been obtained not only in conditions of teacher interactions, but also during transitions, meals, and circle activities.

Peer proximity is defined as remaining within 3 ft of another child, irrespective of interaction with or recognition by the target child. This variable is essentially the inverse of active social avoidance, because the teachers constantly redirect isolated children to be near their peers.

Data samples represent the group of children with autism during 5 min videotaped observations of each child obtained daily for the first 10 consecutive days and the last 10 consecutive days of enrollment. A rotating videotaping schedule ensured that children were observed in noncontrived situations that varied across activities and different times of day. Videotapes were scored for occurrence and nonoccurrence of verbalizations and peer proximity using a partial interval sampling method, which alternated 10 sec observational intervals with 5 sec recording intervals. Interobserver agreement was sampled on approximately one third of each child's videotapes, and percentage agreement exceeded the 80% criteria established a priori.

Results

Data on generalized use of language in the Toddler Center show that 36% of the children with autism emitted verbalizations at program entry (mean age = 2 years, 5 months), although much of the language of verbal children consisted of echolalic or perseverative speech. At the time of exit from the Toddler Center (mean age = 3 years, 5 months), 82% of the toddlers with autism were verbalizing meaningful words. Thus, the majority of Walden toddlers *entered preschool* with

functional, expressive language. These results stand in sharp contrast to reports that 50% of children with autism never develop functional speech (Lord & Paul, 1997).

An example of social progress is evident in a measure of the amount of time that children with autism spent in close proximity (within 3 ft) to other children. Twenty of twenty-eight (71%) of the children with autism showed improvement on this measure. Of the 8 children who showed decreases in peer proximity, 7 remained within expected ranges for same aged typical peers. In sum, only 1 of 28 children failed to demonstrate increased or acceptable levels of peer proximity.

The primary limitations of the data presented are the absence of markers of quality improvements in language and social skills. Although space does not permit an exhaustive review, improvements were obtained for measures of children's verbal interactions with their parents, vocabulary size, social responsiveness to parents and teachers, levels of engagement in toy play, and independent self-care skills. In short, preliminary results suggest that the scope of what may be learned during the preschool years can be dramatically altered by . . . b*eginning intervention during the toddler years.*

Practice and Policy Issues

Two controversial Walden practices bear some discussion, including a verbal only approach to language instruction and an incidental teaching only procedural format. Our position is anchored in philosophy and experience, because there are little data available to either support or refute these unilateral positions.

Virtually all parents of children with autism place a high priority on their children learning to talk. Our documented experience has been that incidental teaching is nearly always effective in producing functional expressive verbal language. In designing the Toddler Program, it seemed logical that if vigorous language instruction began from the outset of early intervention, children would develop language earlier and be better prepared to engage in verbal interactions with peers during preschool. It is recognized that many respected colleagues, including some on our interdisciplinary panel, believe strongly that alternative communication strategies may facilitate future language development (cf. Bondy & Frost, 1994; Quill, 1997). However, prior experience with incidental teaching suggests that children with autism will be most motivated to develop speech if they need to talk to access the many desirable toys and activities that fill their environment.

In addition, full Walden program replications do not mix other instructional formats with incidental teaching, because procedural shifts are often confusing to children. For example, the compliance training needed to do effective discrete trial instruction can be counterproductive to the use of procedures that require spontaneous child initiations. Thus, in one of the first demonstrations of incidental teaching with children with autism, it was necessary to omit the child initiation component because the children had no skills in making choices (McGee et al., 1983). Similarly, a sensory integration approach that requires time investment in brushing a child's arms, or that permits a child to relax while rolled up in a blanket under a table, does not mix well with engagement procedures in the incidental teaching curriculum. Therefore, we assume that parents are best able to select the intervention procedures that they prefer for their child, and we encourage them to remain consistent with the approach that they have chosen. In short, we take the position that the "more is better" tenet applies to hours of intervention, and not to various methods of intervention.

There is an urgent need to translate early intervention research on autism to practice. It is tragic when parents of a 5- or 6-year-old child first learn that their child's differences are due to autism, and that they have missed the most precious intervention years. Many parents whose children are diagnosed early experience similar frustration, because there is no credible treatment option available near their home. When possible, some families move across country in search of treatment for their children. Yet geographic proximity is seldom a guarantee of quality early intervention because Walden, like many intervention programs, consistently has long waiting lists. In short, parents with financial resources find themselves with few options, and families with no resources have virtually no options.

Unfortunately, most publicly funded early intervention programs offer an insufficient number of formal instructional hours, combined with a lack of the specialized curricula needed to promote constant engagement in children with autism. Early intervention providers cannot obtain maximum developmental progress when children with autism receive an insufficient number of planned instructional hours. In sum, it is unlikely that most publicly funded early intervention programs are having substantial impact.

Further, current early intervention services are primarily delivered in home based formats, and few inclusive toddler centers are available. Although it is theoretically possible to replicate the Walden program with the home based component alone, such practice places an enormous burden on families. Moreover, many families do not have access to typically developing peers, who are essential to beginning social intervention when children are young. As the natural environment requirements of the Individuals with Disabilities Education Act take hold in the nation's early intervention systems, it should be recognized that child care centers are part of the natural environment for most toddlers. Center based intervention, in combination with home based intervention, offers children with au-

tism and their families the advantages of intensive early education and normal family functioning.

There remain many empirical and logistical gaps in knowledge of how to provide effective early intervention to children with autism, yet the importance of doing so is evident. Researchers need to work on ways to create more feasible and cost-effective models of intervention. Innovative administrators need to divert the funds they used to invest in litigation *against* parents into substantive program improvements and real intervention choices *for* parents. If we can all rise to the occasion, it should be possible to achieve dramatically expanded benefit for the nation's children with autism and their families.

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