Effectiveness of Discrete Trial Teaching with Preschool Students with Developmental Disabilities

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Abstract: There is a great need to identify instructional methods that effectively promote positive skill development in young children with developmental disabilities. This 2-year longitudinal study evaluated the practicality and effectiveness of two delivery models of providing Discrete Trial Teaching (DTT) to children with developmental disabilities within an existing public preschool program. At baseline all participants demonstrated significant developmental delay in several areas of functioning (communication, motor skills, language, social/adaptive behavior, and cognition). In year 1 of the intervention each participant received DTT in three 10-15-minute intervals each school day. In year 2 participants received DTT in one 30-45-minute interval each school day. Participants who were exposed to both delivery models acquired new skills significantly faster and learned more in year 2, suggesting greater instructional efficiency and effectiveness when DTT was provided in one longer session. The results indicated that DTT has the potential to be used practically and effectively within existing public preschool programs to positively impact the learning and development of young children with developmental disabilities. Implications and directions for future research are discussed.

Since 1968 federal legislation has mandated the provision of preschool programs for children who are at educational risk due to experiencing developmental disabilities (Handicapped Children’s Early Education Assistance Act). As early intervention (EI) and early childhood special education (ECSE) programs have become more widely available, educators and researchers have worked to develop and identify practices that positively impact the development of young children with developmental disabilities. Significant progress has been made, and in 2005 the Division of Early Childhood (DEC) of the Council for Exceptional Children (CEC) summarized the relevant research and published the DEC Recommended Practices in EI/ECSE (Sandall, Hemmeter, Smith, & McLean).

The DEC Recommended Practices provide general guidelines for professionals across several components of EI/ECSE programs including assessment; interventions; family-based practices; interdisciplinary models; technology applications; policies, procedures, and systems change; and personnel preparation (Sandall et al., 2005). For example, in the area of intervention one of the recommended practices is “systematic naturalistic teaching procedures such as models, expansions, incidental teaching, mand-model procedure, and naturalistic time delay are used to promote acquisition and use of communication and social skills” (Sandall et al., p. 89). Such research-based guidelines hold promise for improving the quality of EI/ECSE programs.

However, despite the guidelines provided by the DEC, research indicates that many EI/ECSE professionals may experience difficulty translating the recommended practices into effective assessment and intervention techniques that can be used in the classroom. This is because many EI/ECSE professionals do not receive adequate formal training in assessment and instructional methods that they can...
use in the classroom to facilitate the development of young children with developmental disabilities (Bricker, 1995; Schepis, Reid, Ownby, & Parsons, 2001). Given the increasing number of paraeducators working in EI/ECSE settings (Giangreco & Doyle, 2002; Giangreco, Edelman, Broer, & Doyle, 2001) this problem may actually be worsening, as many paraeducators have lower levels of education and training than teachers (Riggs & Mueller, 2001).

In addition to the training issues, there is an apparent lack of consensus among professionals and researchers regarding how assessment and instructional techniques can be used most effectively in EI/ECSE settings. For example, some researchers have noted that conventional norm-based tests dominate assessment in the field, but have argued against the use of such tests and advocated the use of curriculum and criterion-based assessments that are explicitly linked to intervention efforts (Bagnato, 2005; Downs & Strand, 2006; Macy, Bricker, & Squires, 2005; McConnell, Priest, Davis, & McEvoy, 2002; Vanderheyden, 2005). Regarding instructional methods, some professionals insist that child-directed approaches are most appropriate (Greenspan & Weider, 1999), whereas others tout the merits of teacher-directed approaches to educating young children with developmental disabilities (Engelmann & Osborn, 1970; Lovaas, 2003).

Not surprisingly, these philosophical differences and the relative inadequacy of formal training of EI/ECSE professionals and para-professionals in specific assessment and instructional methods lead to significant variance in the quality and content of EI/ECSE programs. As a result, the developmental and educational outcomes of many children with developmental disabilities are likely to be less than optimal as EI/ECSE educators struggle with the question of how to deliver an appropriate education for each student with whom they work. Indeed, although research suggests that well designed and implemented preschool programs can lead to significant developmental gains for children (Guralnick, 1997; Ramey & Ramey, 2004), there is little doubt that many preschool programs are not as effective as they could be (Downs & Strand, 2006; Ramey & Ramey, 1998, 2004).

There is a clear need to continue identifying and empirically validating effective assessment and instructional techniques that lead to significant developmental gains for children with developmental disabilities. Such techniques should be consistent with the DEC Recommended Practices, and it is critical that educators are able to implement the methods within EI/ECSE settings. To that end, assessment and instructional techniques that are simple, practical, cost-effective, flexible, and that have clear and efficient training procedures are likely to be most helpful. Of course, it is of primary importance that the methods used by EI/ECSE educators lead to observable and measurable developmental gains for children with developmental disabilities. In addition, researchers and educators must continue to identify and document the specific assessment and instructional methods that tend to be more effective for children with specific developmental, diagnostic, and/or cultural characteristics.

Discrete Trial Teaching (DTT) is an instructional method that has been used for decades to improve the developmental and educational outcomes of children with autism and developmental delay (Lovaas, 1987, 2003; McEachin, Smith, & Lovaas, 1993; Smith, 1999, 2001). Grounded in the experimental analysis of behavior, DTT (described in the methods section) is a specific type of teacher-directed instruction that individualizes and simplifies educational interactions to improve children’s learning. DTT has been used to help children with autism acquire a wide range of skills including receptive and expressive language (Lovaas, 1977; Howlin, 1981; Young, Krantz, McClannahan, & Poulson, 1994); imitation (Coe, Matson, Fee, Manikam, & Lanarello, 1990; Young et al.); grammar and syntax (Risely, Hart, & Doke, 1972); play skills (Coe et al.); conversational skills (Krantz & McClannahan, 1981); and social and emotional skills (Downs & Smith, 2004).

Often, the gains children with autism make in response to DTT are quite impressive. For example, studies by Lovaas and his colleagues showed that 47% of young children with autism treated intensively with DTT achieved normal (i.e., average or above) levels of intellectual and academic functioning after two to three years of treatment and that those gains were maintained over several years (Lovaas, 1995; Schepis, Reid, Ownby, & Parsons, 2001).
Those accomplishments are particularly impressive considering the relatively severe developmental difficulties typically associated with autism and extremely poor prognosis for children with the disorder prior to the use of DTT methods (Klinger & Dawson, 1997; Rutter, 1985).

In addition to the efficacy DTT has demonstrated with children who have autism and developmental delay, the technique has several advantages that make it a promising strategy for work with children who have developmental disabilities other than autism in EI/ECSE settings. As noted, DTT has proven particularly useful in teaching young children with autism to acquire a wide range of new skills. As such, educators who learn the relatively simple procedure can work to facilitate skill development in young children across desired domains depending on the individual child’s needs and strengths. In addition, because one component of DTT is ongoing data collection tracking student progress in learning important skills, educators are able to conduct a continuous, curriculum-based formative assessment of student progress. This integration of assessment and instruction is considered critical by researchers in the field (Downs & Strand, 2006; Macy et al., 2005; Vanderheyden, 2005) and allows educators to provide a truly individualized and developmentally appropriate education for young children with developmental disabilities.

Another strength of DTT includes the use of extremely short instructional units (i.e., typically one to five seconds) that facilitate rapid skill acquisition and allow for up to 200 learning opportunities per hour (Smith, 2001), thus making the procedure quite efficient. The short instructional units are also developmentally appropriate for preschool age children who typically have limited attentional capacities. In addition, the emphasis DTT places on shaping and positive reinforcement of child learning inevitably results in a high rate of positive interaction between educator and student as children receive both desired tangible rewards and teacher praise throughout learning sessions. Lastly, the short DTT instructional units also allow EI/ECSE educators to flexibly engage in learning activities with children throughout their school day as dictated by student and program needs. For example, discrete trials can be embedded into the ongoing activities of the preschool (Bride & Schwartz, 2003) or can be used as an adjunct to regular EI/ECSE programming much as speech therapy and other services currently are (Downs, Downs, Johansen, & Fossum, 2007).

Importantly, there are clear and efficient training procedures that can be used to teach EI/ECSE educators (teachers, paraeducators, tutors, and caregivers) to implement DTT across environments. With appropriate supervision just about any person in a young child’s life can learn how to facilitate the child’s skill development through the use of DTT. This not only allows for more learning opportunities for the child throughout the day, but also can help facilitate the ability of the child to generalize skills they have learned in the preschool across time, people, and environments. In this way the use of DTT can lead to significant improvements in the adaptive functioning of children with developmental disabilities.

Considering those strengths noted and the striking success of DTT with children who have autism and developmental delay it is somewhat surprising that this method has not been implemented widely with children who have developmental disabilities other than autism. This is especially true when one considers that young children with developmental disabilities often display some characteristics that are similar to young children with autism such as attentional and social skills deficits, developmental delay, and behavior problems (Lovaas, 2003). Further, because children with autism often display more severe difficulties across areas than children with other developmental disabilities one would logically expect that the latter may respond even more favorably to DTT.

In order to evaluate that possibility Downs and colleagues (2007) investigated the effectiveness of providing DTT to young children with various developmental disabilities who were enrolled in a public developmental preschool program. This setting was chosen because it was important to determine whether DTT could be implemented in a practical, time-limited (i.e., cost effective) manner within the existing structure in which the majority of children with developmental disabili-
ties currently receive services (McBride & Schwartz, 2003). The results of this study indicated that children who were “pulled out” of their regular preschool programming in 10- to 15-minute blocks of time in order to receive DTT in an adjacent classroom or on the playground made significant developmental gains that were not observed in children enrolled in the preschool who did not receive DTT. Specifically, at the end of the academic year the children who received DTT showed significant developmental gains in communication, daily living skills, social skills, and overall adaptive behavior, whereas children in the control group (who received the same amount of overall teacher attention) did not make such gains. In addition, data indicated that exposure to DTT resulted in significant learning across several important skill areas for each child in the study (Downs et al.).

Although the results of this study were promising and provide support for the use of DTT with young children who have developmental disabilities, questions were raised regarding the best way to provide those services within public preschool settings. For example, it was noted that some of the children had significant difficulty with the multiple transitions that were required to pull them out and place them back into the regular preschool setting three times each day (Downs et al., 2007). Considering the difficulty students appeared to have with transitions there were two alternative possibilities to explore regarding service delivery. First, DTT could be embedded within the ongoing activities of the preschool. Second, DTT could be provided as an additional service either directly following or prior to the regular preschool hours. The purpose of the present study was to evaluate the effectiveness of providing DTT to children with developmental disabilities as an additional service when compared to the “pull-out” model used in the Downs et al. study.

Method

Participants

Participants were three children (two boys and one girl) who were enrolled in a publicly funded developmental preschool for two consecutive academic years and whose parents elected to have them participate in the research project. All three students demonstrated significant cognitive and language delay (i.e., 2 or more standard deviations below the mean) as well as significant delays in additional areas of functioning. Table 1 presents information for each student regarding age and diagnostic and developmental status. As a result of their developmental disabilities all three were at serious risk for poor educational, behavioral, and psychosocial outcomes.

Procedure

**DTT Instruction.** Each DTT unit of instruction lasts for approximately 3-10 seconds and consists of five parts, as follows (see Lovaas, 2003 and Smith, 2001 for a more detailed description of DTT procedures):

<table>
<thead>
<tr>
<th>Age in Months</th>
<th>Diagnosis</th>
<th>Areas of Delay (&gt; 2 SD Below Normed Mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>Cerebral Palsy</td>
<td>Cognitive, Language, Communication, Daily Living Skills, Socialization, Motor Skills, Adaptive Behavior</td>
</tr>
</tbody>
</table>
1. Discriminative Stimulus (Cue): The instructor presents a brief instruction or question to the student (e.g., “What color is it?” or “Touch your nose”).

2. Prompt: In conjunction with or immediately after the cue, the instructor assists the student in responding correctly to the cue (e.g., the teacher physically or orally models the response or takes the student’s hand and guides him/her to perform the response). As instruction progresses the prompt is gradually faded and eventually eliminated so that the student responds to the cue alone.

3. Response: The student gives a correct or incorrect answer to the cue.

4. Consequence: Correct responses are immediately reinforced with verbal praise, access to toys, or other things the particular student enjoys. If an incorrect response is given the instructor withholds positive reinforcement or provides corrective feedback (e.g., “No”).

5. Inter-trial interval: After the consequence, the instructor pauses for 1-5 seconds before presenting the cue for the next learning trial.

Students typically spend 15 minutes or less in each DTT session and take an approximately 5- to 15-minute play break in between each session during which time the instructor prepares materials for the next session and checks the just collected data for accuracy and completeness. The data collection consists of a documentation of each learning trial that includes information on the items targeted, student responses, and the level and type of any prompt that was used. This ongoing data is used to continuously modify instruction and goals to ensure maximum benefits and efficacy.

**DTT Training.** The lead experimenter, a clinical psychologist with extensive training and experience in DTT, provided training in DTT procedures to undergraduate and graduate student research assistants at the beginning of each academic year, as well as at two additional training sessions within each school year. Research assistants assigned to provide DTT (hereafter referred to as instructors) received between 15 and 20 hours of didactic training, modeling, and practice with corrective feedback provided by the lead experimenter and a graduate student who also had several years experience providing DTT. The two primary trainers assessed instructor competence in correct use of DTT instructional procedures and recording of student responses (assessment) in vivo following the training period using an adaptation of definitions and procedures outlined by Koegel, Russo, and Rincover (1977). Inter-observer reliability was calculated for 25% of the instructor competence ratings with agreement ranging from 90 to 100%. Competence of individual instructors following training ranged from 79 to 96% correct use of DTT instructional and assessment procedures.

**Implementation of DTT.** Students attended the preschool for two hours per day an average of three days per week (6 hours total per week). In year 1 of the study students were “pulled out” of their regular preschool programming in 10- to 15-minute blocks of time in order to receive the DTT instruction on a one-to-one basis in an adjacent classroom or outside on the playground. In year 2 of the study students received DTT instruction on a one-to-one basis in an adjacent classroom in three consecutive 10-15 minute blocks of time, separated by play breaks, following their regular preschool programming. In year 1 each student received between 32 and 42 hours of DTT over the course of the 27 weeks of the intervention for an average of 1.30 to 1.58 hours of DTT per week. In year 2 each student received between 16 and 60 hours of DTT over the school year for an average of 1.05 to 2.28 hours of DTT per week.

DTT procedures were used to teach the students skills in several developmental areas including receptive and expressive language (e.g., identification of objects, behaviors, emotions, colors, shapes), socialization (e.g., conversational skills, turn-taking), pre-academics (e.g., letters, numbers, counting), imitation (e.g., gross and fine motor), daily living skills (e.g., following directions), and fine motor skills (e.g., drawing, cutting). Following baseline assessments and consultation with caregivers and the regular preschool teacher, an individualized curriculum was developed for each student using materials adapted from Lovaas (2003) and Leaf and McEachin (1999). Due to varying strengths and weak-
nesses not every student received instruction in every domain (e.g., two children did not receive instruction in the expressive identification of numbers and letters, whereas one did). Whenever possible, instruction was balanced across developmental areas for each student and explicitly linked to desired learning objectives.

Procedural integrity. To ensure treatment fidelity, the lead experimenter and/or a graduate assistant with extensive training and experience implementing DTT supervised all sessions, and daily feedback was given to each instructor orally and via a structured checklist. The checklist was developed using definitions provided by Koegel et al. (1977) and was utilized daily until the instructors achieved at least 90% competence in all skill areas of instruction and assessment. After achieving at least 90% competence, instructors were rated on the checklist and provided feedback a minimum of once per week, while also continuing to receive daily oral feedback. Inter-rater reliability for the structured checklist was assessed periodically throughout the school year (i.e., every 3 weeks), with agreement ranging from 87 to 100%. Daily data also was collected to assess the amount of intervention provided and the extent to which instruction was provided across all programs in each student’s curriculum.

Caregivers of the students were provided training in DTT and the availability of ongoing supervision, and were encouraged to provide additional in-home instruction for their child. However, none of the caregivers reported providing in-home DTT to their children, with each citing time constraints as the major barrier to doing so. Thus, only the designated DTT instructors provided DTT instruction to students. Additionally, it is important to note that none of the students were reported by their caregivers as receiving any services in the home or community other than those provided at the preschool.

Results

**DTT Programs and Item Mastery**

Tables 2, 3, and 4 summarize data regarding the number of items within each DTT program area that each student did not know at baseline and mastered by the end of year 1 and year 2. Items were considered mastered if the student responded correctly at least 80%
of the time over at least two days, with two different instructors. The number of specific programs in each student’s curriculum on any given day ranged from a low of six for student 3 to a high of 15 for student 2. As shown in the tables the number of total items mastered by each student was greater in year 2 than in year 1, with student 1 showing a modest increase and students 2 and 3 showing much larger increases in number of items mastered.

**Rate of Learning within DTT Programming**

Table 5 presents data regarding the number of items mastered per hour and per day of DTT intervention. Although student 1 showed only a modest increase in the total number of items mastered in year 2 compared to year 1, this was mainly a result of the student missing approximately half of the academic year due to illness. As seen in Table 5, the learning rate (i.e., the number of items mastered per hour and per day of DTT intervention) of student 1 increased substantially in year 2 compared to year 1 as he learned more than twice as many items per hour and per day in year 2 compared to year 1. Similarly, students 2 and 3 also demonstrated substantial increases in learning rate in year 2 when compared to year 1. Student 2 learned almost twice as many items per hour and more than twice as many items per day in year 2. Student 3 learned more than twice as many items per hour and more than three times as many items per day in year 2. It is also important to note that students 1 and 2 (the children with developmental disabilities other than autism) both mastered more items per hour and per day than student 3 (the child with autism) in both years 1 and 2.

**Discussion**

Results of the present study and those from year 1 of the intervention (Downs et al., 2007) indicate that even relatively small amounts of instruction (i.e., 30-45 minutes per day) provided in a discrete trials format can lead to significant learning and developmental gains.

### TABLE 4

**Items Mastered Within Discrete Trial Teaching Programs in Year 1 and Year 2 for Student 3**

<table>
<thead>
<tr>
<th>Program</th>
<th>Year 1 Items Mastered</th>
<th>Year 2 Items Mastered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptive Instructions</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>Receptive Colors</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Receptive Objects</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>Receptive Emotions</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Receptive Body Parts</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Receptive Numbers</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Imitation With Objects</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Motor Imitation</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Verbal Imitation</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Sign Language</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Drawing</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Total Items</td>
<td>26</td>
<td>87</td>
</tr>
</tbody>
</table>

### TABLE 5

**Number of Items Mastered Per Day and Per Hour of DTT for Students in Year 1 and Year 2**

<table>
<thead>
<tr>
<th>Student and Year</th>
<th>Total DTT Hours</th>
<th>Total DTT Days</th>
<th>Items Mastered Per DTT Hour</th>
<th>Items Mastered Per DTT Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>31.92</td>
<td>62</td>
<td>2.29</td>
<td>1.18</td>
</tr>
<tr>
<td>Year 2</td>
<td>16.83</td>
<td>39</td>
<td>5.59</td>
<td>2.41</td>
</tr>
<tr>
<td>Student 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>35.10</td>
<td>67</td>
<td>3.53</td>
<td>1.85</td>
</tr>
<tr>
<td>Year 2</td>
<td>37.46</td>
<td>58</td>
<td>6.35</td>
<td>4.10</td>
</tr>
<tr>
<td>Student 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>41.10</td>
<td>91</td>
<td>0.63</td>
<td>0.29</td>
</tr>
<tr>
<td>Year 2</td>
<td>60.18</td>
<td>92</td>
<td>1.45</td>
<td>0.95</td>
</tr>
</tbody>
</table>

DTT = Discrete Trial Teaching
for children with a range of developmental disabilities enrolled in public preschool programs. This may be particularly true for children who have developmental disabilities other than autism, as the results from years 1 and 2 suggested that such children evidenced significantly higher rates of learning and larger developmental gains than did children with autism. In addition, providing DTT in one block of time per day as an additional service may be more effective than providing DTT in shorter blocks of time as a “pull-out” service. Although year 1 of the study demonstrated that the “pull-out” model resulted in significant skill gains and accelerated development across domains (Downs et al.), all three students exposed to both delivery models mastered a higher number of learning items and exhibited a faster rate of skill acquisition when DTT was provided via the additional service model.

There are several possible explanations for these findings. First, it is possible that the students learned more in year 2 of the study simply because they received more hours of DTT. This certainly was true for student 3 who received over 60 hours of DTT in year 2 compared to only 41 hours in year 1. However, closer examination of the data reveals that this student mastered over three times as many total items and over twice as many items per hour in year 2. Thus, the observed increase in learning was the result of more efficient learning, not simply more time receiving DTT. Indeed, student 1 received less than 17 hours of DTT in year 2 and over 31 hours in year 1, yet mastered a higher number of items in year 2 and learned almost two and a half times more items per hour in year 2. Similarly, student 2 only received 2.36 more total hours of DTT in year 2, but mastered almost twice as many total items and learned almost twice as many items per hour as in year 1.

Another, more likely, explanation for the improved learning in year 2 is that the time each child spent within DTT sessions was used more efficiently. Behavioral observations conducted over both years of the intervention indicated that all three students exhibited significantly less off-task behavior in year 2 compared to year 1. This resulted in a higher rate of learning trials conducted with each student in year 2, thus allowing more teaching and learning to occur. Although, one could argue that the increase in on-task behavior was simply due to shaping and the students becoming acclimated to the DTT procedures, it appears more likely that the increase in on-task behavior was the result of removing the multiple transitions students were exposed to in year 1 of the intervention (Downs, et al., 2007). This is because we did not observe a gradual increase in on-task behavior over the course of the two-year intervention. Rather, on-task behavior improved slightly and inconsistently over the course of year 1, and then improved rapidly and extremely consistently in year 2 when the multiple transitions were no longer required. Off-task behaviors were still observed at times during year 2, but at a much lower rate than in year 1 for all three students.

The finding that more efficient use of DTT instructional time was associated with increased learning is an important one. Publicly funded EI/ECSE services are provided to young children with developmental disabilities in the hope that such services will improve their learning outcomes. If the promise of such programs is to be fully realized it is critical that early childhood educators efficiently use whatever time they have with students in order to facilitate learning to the greatest extent possible. As noted earlier, many preschool educators and paraeducators receive little formal training in specific instructional and assessment methods (Bricker, 1995; Schepis et al., 2001). As a result, it is highly likely that many students with developmental disabilities are receiving less efficient instruction and learning much less than they could. One relatively simple way of improving instructional efficiency is organizing assessment and instructional activities within a discrete trials format.

This is not to say that the only appropriate method for working with young children with developmental disabilities is traditional teacher-directed DTT. Indeed, many professionals recognize the benefits of using naturalistic and activity-based instruction, and child-directed learning (Delprato, 2001; Greenspan & Weider, 1999; Sandall et al., 2005). Although often portrayed as contrasting approaches, DTT and naturalistic, activity-based instruction are not incompatible. McBride and Schwartz (2003) demonstrated that preschool
teachers could be efficiently and effectively trained to embed discrete trial instruction within ongoing preschool activities. Following training the teachers engaged in higher rates of instruction geared toward important child skills, and the students subsequently practiced the skills more frequently and learned them more effectively. The findings of the McBride and Schwartz study and our own work suggest that increasing the amount of instruction that is provided to young children with developmental disabilities in a DTT format leads to improved instructional efficiency, as well as significant and observable gains in student learning. This is true whether the DTT format is used within child-initiated, play-based activities or within teacher-initiated learning sessions.

Why is DTT so effective in facilitating learning and skill development in young children with developmental disabilities? DTT requires that educators be intentional and systematic in how they approach instruction. Specific critical skills across developmental domains can be identified a priori and educators are prompted to engage in instructional activities designed to teach those skills with sufficient frequency and intensity. In addition, DTT provides assessment data that can be used for several purposes, the most important of which is monitoring student learning in response to intervention and tracking student progress on critical skill development over time. This feedback mechanism further increases the likelihood that students with developmental disabilities will make important developmental gains when enrolled in EI/ECSE programs. As noted in the DEC Recommendations, it is important that effective instruction be provided to children with developmental disabilities within contexts that are developmentally appropriate, motivating, and aligned with student interests (Sandall et al., 2005). Certainly play and child-directed activities are an important part of EI/ECSE programs. However, as noted by McBride and Schwartz (2003) simply providing an appropriate learning context is not sufficient to ensure children with developmental disabilities will make gains. If children, particularly those with disabilities, are to learn and develop critical skills, EI/ECSE educators need to explicitly target those skills and find a way to teach them. Although a variety of methods may achieve that result, DTT provides a simple, effective, and efficient way to do so.

There is a tremendous need to identify methods that significantly improve the developmental and educational outcomes of students with disabilities enrolled in EI/ECSE programs. This problem is a significant one considering the large number of students that receive publicly funded special education services throughout their school years. Many students and educators could benefit from having access to a simple and effective approach designed specifically to help build skills and accelerate development in students with developmental disabilities. The present results are consistent with previous research (Downs et al., 2007; Lovaas, 1987, 2003; McBride & Schwartz, 2003; McEachin at al., 1993) and suggest that organizing instructional and assessment activities in a DTT format facilitates child learning and development across domains, and can lead to tangible improvements in school readiness for children with various developmental disabilities. In addition, EI/ECSE educators with no previous experience can easily be trained to effectively implement DTT as one part of existing preschool programs, either embedded within ongoing preschool activities (McBride & Schwartz) or as an adjunct to regular preschool programming (Downs et al.).

Additional research is needed to analyze how DTT and other specific instructional and assessment methods may most effectively be used to accelerate development in students displaying specific diagnostic and developmental profiles. This analysis should include an examination of the level of service required for students with differing characteristics to realize significant gains. Future studies should also evaluate the long-term outcomes of students with developmental disabilities who are exposed to DTT and other methods in the preschool years and the long-term cost-effectiveness of such methods. EI/ECSE programs provide publicly funded services to some of our most vulnerable young citizens, and it is critical that educators and paraeducators have access to simple, practical, and efficient methods such as DTT that will allow them to maximize the effectiveness of intervention to the greatest extent possible.
References


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