Article

Hammill Institute on Disabilities

Focus on Autism and Other Developmental Disabilities
28(4) 212–221

DOI: 10.1177/1088357612465120
focus.sagepub.com
SAGE

Training New Instructors to Implement Discrete Trial Teaching Strategies With Children With Autism in a Community-Based Intervention Program

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Abstract

The effects of training and supervision on instructor knowledge and performance of discrete trial teaching (DTT) within three domains (DTT Technical Skills; Work Session Preparation/Conclusion; and Student Engagement/Management) were examined in this study. Eight undergraduate student instructors received an 8-hr training in DTT and support skills accompanied by a pre- and post-test of knowledge. The instructors then taught a variety of skills to six students with autism in a community-based preschool, where instructor competence was tracked and performance feedback provided using the Discrete Trial Teaching Competency Checklist for Instructors. Competence in all three domains improved over time with performance feedback. However, significant variability was observed within and between instructors, and performance in some areas remained below optimal levels even with regular supervision and performance feedback. Implications for training and supervising instructors to implement DTT with children with autism in community-based settings are discussed.

Keywords

training, discrete trial teaching, supervision, preschools

The number of preschool-age children (i.e., between 3 and 5 years) with an autism spectrum disorder receiving special education in publicly funded programs in 2008 was 44,934, and the total number of preschoolers with developmental disabilities served was 257,029 (IDEA Data, 2010). It is important to note the number of children with developmental disabilities because many students with autism are initially served under the category of developmental disability. Given the number of young children with autism in need of special education and the requirements of the Individuals With Disabilities Education Improvement Act (IDEA; U.S. Department of Education, 2006), there has been a significant increase in the number of community-based early intervention programs serving infants, toddlers, and preschoolers identified with autism (Heflin & Simpson, 1998; Hurth, Shaw, Izeman, Whaley, & Rogers, 1999). Whereas having early intervention programs available is important, it is perhaps equally important that such programs utilize interventions that have been proven to effectively promote development in children with autism. A requisite component of implementing effective intervention programs is having well-trained staff. Therefore, in addition to identifying evidence-based practices for educating individuals with autism, it also is critical to examine how to best train school personnel (e.g., teachers, support staff, paraeducators) to implement evidence-based instructional methods with students with autism in community-based settings.

To date, significant progress has been made toward establishing evidence-based practice in the field of autism intervention (Lord et al., 2005; Weisz, Chu, & Polo, 2004). An example of an evidence-based intervention is discrete trial teaching (DTT), which has been proven to significantly improve the developmental and educational outcomes of children with autism and developmental delay (Lovaas, 1987, 2003; McEachin, Smith, & Lovaas, 1993; Smith, 1999). Grounded in the experimental analysis of behavior, DTT is a specific type of teacher-directed instruction that utilizes simple instructional cues, prompting, positive reinforcement, and a continuous formative assessment to shape behavior and improve children's learning (see Smith, 2001, for a description of DTT). DTT has proven particularly effective in helping young children with autism

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acquire a wide range of new skills (Coe, Matson, Fee, Manikam, & Lanarello, 1990; Howlin, 1981; Krantz & McClannahan, 1981; Lovaas, 1977; Risley, Hart, & Doke, 1972; Young, Krantz, McClannahan, & Poulson, 1994). Recently, DTT also has been used to facilitate skill development in preschoolers with developmental disabilities other than autism (Downs, Downs, Fossum, & Rau, 2008; Downs, Downs, Johansen, & Fossum, 2007).

Due to its many demonstrated strengths and proven effectiveness, it is likely that DTT will continue to be an important component of educational interventions for children with autism and other developmental disabilities. Indeed, DTT, within the broader category of behaviorally based intervention, has been classified as a proven evidence-based practice by the National Autism Center (2010) and the National Research Council (2001), and parents of children with autism have increasingly demanded that their children be provided publicly funded DTT-based educational programming (Choutka, Doloughty, & Zirkel, 2004).

Importantly, DTT is effective only when it is implemented correctly, and it seems that a significant gap exists between what is recommended in the literature and what is actually practiced in the field (Downs & Downs, 2010; Lord et al., 2005; Weisz et al., 2004). Researchers suggest that many teachers either do not use research-based interventions (Stahmer, Collings, & Palinkas, 2005) or do not implement the interventions effectively (Stahmer, 2007). Perhaps due to this research-to-practice gap, community-based educational settings for children with autism have not always been able to show efficacy in terms of student learning outcomes (Chasson, Harris, & Neely, 2007). As more educators and paraeducators seek to use DTT to enhance the learning and educational outcomes of their students with autism and other developmental disabilities, it is critically important to evaluate the extent to which individuals with no prior training or experience can be efficiently and effectively trained to use DTT. It also is necessary to examine whether learning to implement DTT via training translates into the ability to teach children with autism important skills linked with desired learning outcomes *in vivo* in community-based intervention programs.

Numerous researchers have shown that previously naïve instructors can be taught to correctly implement basic DTT procedures with children with autism and other developmental disabilities. Unfortunately, most research conducted thus far has somewhat narrowly examined instructor performance of the basic DTT procedural skills following training, while ignoring the various support behaviors needed to effectively implement DTT in community-based classroom settings (Belfiore, Fritts, & Herman, 2008; Bolton & Mayer, 2008; Crockett, Fleming, Doepke, & Stevens, 2007; Gilligan, Luiselli, & Pace, 2007; Leblanc, Ricciardi, & Luiselli, 2005; Sarakoff & Sturmey, 2004). Researchers suggest this rather narrow focus on the basic DTT skills is somewhat misguided because when instructors use DTT, the amount of student learning that occurs is directly related to instructor competence in the specific DTT procedures and the skills that are needed to support DTT implementation (Downs, Downs, & Rau, 2008). Because of this, it is critical to assess not only instructor proficiency in the DTT procedural skills but *also* the various support skills (e.g., preparing for and concluding sessions, effectively managing student behavior) needed to implement DTT programs within instructional settings so that students with autism learn and make progress toward desired outcomes across an academic year.

In addition to examining the full range of skills needed to implement DTT, it is crucial to identify training procedures that can be used to efficiently and effectively train the numerous educators, paraeducators, and parents who work with children with autism in community-based settings. Some of the training procedures for new DTT instructors have involved 25 hr or more of direct contact between trainers and new instructors (Ryan & Hemmes, 2005). Although such extensive trainings are effective in teaching the basic DTT procedures, they also carry a rather significant cost in terms of money and time. Because of those costs, researchers have recently called for identification and evaluation of more efficient and cost-effective training procedures (Fazzio, Martin, Arnal, & Yu, 2009; Thomson, Martin, Arnal, Fazzio, & Yu, 2009) that can be adopted more readily in real-world settings.

Efforts to streamline DTT training procedures have demonstrated some initial success, with researchers suggesting that training lasting 3 hr or less can effectively teach new instructors to implement the basic DTT procedures (Bolton & Mayer, 2008; Gilligan et al., 2007; Leblanc et al., 2005), as well as some of the DTT support skills (Fazzio et al., 2009). However, it is important to note that due to their designs, none of those researchers demonstrated that new instructors were able to correctly implement the full range of DTT instructional and support skills across different learning tasks and children following training. This is a critical issue when one considers that instructors in community-based classrooms serving children with autism will often be asked to use DTT to teach a wide range of skills from acquisition through mastery to many different children who may demonstrate quite variable behaviors and abilities. That is, it is not enough for instructors to know how to effectively use basic DTT procedures; they must be able to manage challenging behavior, keep to a timely and efficient schedule, and manage curricular materials and programs at the same time they are effectively using the basic DTT procedures.

This study was designed to evaluate the real-world effectiveness of DTT instructor training procedures developed and shown to be efficacious by Downs, Downs, and Rau (2008) within a community-based classroom setting. We also sought to add to the extant literature in DTT instructor training in three additional ways. First, we evaluated the utility of adding an assessment of instructor

knowledge as part of the training procedure. This involved assessing instructor knowledge of the DTT procedural and support skills prior to and following training, and investigating how instructor knowledge following training was related to actual performance when working with children with autism in a community-based intervention program. Second, rather than computing overall instructor proficiency scores, we examined the effects of training and supervision on instructor knowledge and performance of DTT within three specific domains (DTT Technical Skills; Work Session Preparation/Conclusion; and Student Engagement/Management), thus allowing us to evaluate which aspects of providing DTT were most challenging for instructors to learn to implement correctly. Finally, within the domain of technical skills, we examined which skill area (i.e., discriminative stimulus, reinforcement, prompting) proved most challenging for new instructors to learn. By conducting a more comprehensive and specific analysis of the various technical and support skills needed to effectively implement DTT, we sought to shed light on which skills may require more attention when training and supervising instructors who are implementing DTT *in vivo* with students with autism for the first time.

Method

Participants and Setting

Participants were eight undergraduate research assistants (instructors) and six children (students) who were enrolled in a publicly funded multidisciplinary developmental preschool program in the Pacific Northwest. All eight instructors were junior or senior psychology or special education majors between 20 and 24 years of age who had demonstrated solid academic performance (i.e., grade point average [GPA] over 3.0) and an interest in working with preschoolers with developmental disabilities. None of the instructors had experience working with young children with developmental disabilities, and none had previously taught children in any formal educational setting. The instructors had no prior exposure to DTT methods and were not known to the students before participating in this study.

The students were between the ages of 3 and 5 years and each had a diagnosis of autism. All of the students were boys who were demonstrating significant developmental delays (i.e., two standard deviations below the mean) in the areas of language, cognition, adaptive functioning, and social skills. The students were referred to the community-based preschool program as a result of their diagnostic status and developmental delays. Students attended the preschool 4 hr per day, 4 days per week. As part of their multidisciplinary programming at the preschool, each student received approximately 1 hr of DTT per day that was delivered by the instructors. Prior to the start of this study, none of the students had ever received any DTT.

Materials

DTT Competency Checklist for Instructors (DCCI). The 35-item DCCI, developed as part of a previous study (Downs, Downs, & Rau, 2008; see the appendix), was modified for use in this study to assess the specific procedural skills required to conduct DTT, as well as the numerous support skills needed to implement DTT programming properly. Specifically, the DCCI was used to rate instructor performance as unsatisfactory, in progress/needs improvement, or satisfactory in three skill areas. The first skill area was comprised of 10 items and titled *Work Session Preparation/Conclusion* (e.g., be prepared with all materials before students arrive and before initiating each program). The second skill area included 19 items and assessed *Technical Skills* (e.g., deliver reinforcing stimulus [Sr] immediately following correct responses). The third skill area included 6 items and was titled *Student Engagement/Management* (e.g., ignore inappropriate student behavior when applicable).

Instructors were rated on the DCCI by raters who were advanced graduate students or faculty who had extensive experience implementing DTT procedures and using the DCCI. For some DCCI items, satisfactory performance was simply based on instructor performance of the necessary skill (e.g., read behavioral/clinic notes before session begins). For skills that could not be rated on a presence/absence basis because they occurred numerous times throughout each session (e.g., S^D is clear, concise, uninterrupted), the skills were rated as follows: Satisfactory performance ratings were based on at least 90% correct performance; needs progress/improvement ratings were based on 50% to 90% correct performance, and unsatisfactory ratings were based on 0% to 49% correct performance of the skill across all daily sessions. Participant scores in each of the three skill areas were calculated by summing the number of items on which the participant was rated as demonstrating satisfactory performance and dividing the result by the total number of items within that skill area.

DTT theoretical assessment (DTA). The DTA is a 33-item written assessment that was developed by the authors to assess instructor knowledge of the same DTT and support skills assessed by the DCCI. Specifically, the DTA contained 10 items assessing Work Session Preparation/Conclusion (e.g., List the five tasks you need to complete before initiating DTT with a child), 17 items assessing Technical Skills (e.g., If needed, when should a prompt be delivered within a discrete trial?), and 6 items assessing Student Engagement/Management (e.g., How should you respond to mildly inappropriate child behavior?). The items on the DTA were drawn directly from the DCCI and simply translated from rating statements to knowledge questions. Two DCCI items in the Technical Skills area were deemed too difficult to translate into appropriate knowledge questions and were excluded from the DTA. However, all of the 33 items included in the DTA corresponded directly to

items on the DCCI, thus allowing for a content valid assessment of instructor knowledge of the DTT and support skills on which they would be rated when working with children in the classroom. Each item on the DTA was scored as *correct* or *incorrect*, and participant scores in each of the three skill areas were calculated by summing the number of correct responses and dividing the result by the total number of items within that skill area. Instructors completed the DTA prior to and immediately following training. Interested readers may contact the authors for a copy of the DTA.

Procedures

DTT training. The lead experimenters, a clinical psychologist and a special educator with extensive training and experience in DTT, provided training in DTT and support skills to instructors at the beginning of the academic year. After completing a pretraining DTA to assess instructors' preexisting knowledge of DTT procedures and support skills, the instructors were trained in one 8-hr session. The training procedures were designed to approximate a typical in-service training that might be provided to educators and paraeducators in school settings and were consistent with those used in the Downs, Downs, and Rau's (2008) study. As such, the training consisted of didactics, live modeling of correct and incorrect procedures, and skill practice with corrective feedback. By the end of the training, each instructor had twice practiced implementing a 30-min DTT session from beginning (e.g., selecting and organizing stimuli and reinforcers) to end (e.g., summarizing data and writing behavioral notes for the sessions). Following the training, instructors again completed the DTA to assess the extent to which their knowledge of DTT procedures and support skills increased as a result of the training.

Implementation of DTT. Following consultation with caregivers and preschool staff, and utilizing the students' individualized family service plans (IFSPs), a DTT-based curriculum was developed for each student that included skills in the areas of receptive and expressive language (e.g., identification of objects, behaviors, emotions, colors, shapes), socialization (e.g., conversational skills, turn-taking), preacademics (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). Due to their varying strengths and weaknesses, not every student received instruction in every domain (e.g., some children who did not yet speak did not receive instruction in expressive language programs). Preschool staff and the researchers regularly reviewed and modified, as needed, each student's DTT-based curriculum to ensure that each student was learning skills across the developmental areas listed above, and that those skills were explicitly linked to desired learning objectives contained in the students' IFSPs.

Approximately 1 week following completion of the training, instructors began using DTT on a one-to-one basis with the students in the program. Instructors conducted two 30-min DTT sessions each day they worked in the classroom, and each instructor worked an average of 2 days per week. In each of the two daily DTT sessions, instructors typically conducted between 50 and 100 discrete trials. Instructors conducted DTT with the same student for each of the two daily sessions; however, instructors worked with different students on different days. This was done to give instructors experience working with students who were displaying a range of developmental levels and behaviors, as well as to ensure that instructor DTT skills generalized across students and the various skills taught to the students.

Rating instructor DTT performance. The raters observed instructors throughout their work shifts in the preschool and rated their performance as satisfactory, in progress/needs improvement, or unsatisfactory across all DCCI checklist items. It is important to note that because researchers previously have found that new instructors do not display high levels of competence in DTT without being provided additional performance feedback (Arnal et al., 2007; Belfiore et al., 2008; Downs, Downs, & Rau, 2008; Fazzio et al., 2009), corrective feedback was provided to instructors immediately following completion of their first day in the classroom. This allowed us to ensure that instructors were providing adequate intervention services to the students in the program. Thus, each instructor completed one initial day of DTT that provided a posttraining assessment of their DTT skills, followed by several subsequent days of DTT over the course of the academic quarter that allowed us to track the progress the instructors made in achieving competence across the three skill areas assessed by the DCCI.

Because there were more instructors than raters in the classroom, each instructor was not rated during every work shift across the quarter. Rather, following their initial day in the classroom, the instructors were each rated approximately 1 day per week resulting in each instructor being rated on 6 different days across the academic quarter. Summary feedback and ratings were provided to instructors at the end of the work shifts during which they were rated using the DCCI and complimentary oral feedback. In this way, each instructor received positive written and oral reinforcement for satisfactory skill performance and corrective written and oral feedback contingent upon unsatisfactory skill performance.

Interrater reliability. Two independent raters observed and rated each instructor's performance with the DCCI for one out of six of the rated work shifts across the academic quarter. Interrater reliability was calculated by dividing the number of agreements by the total number of items on the DCCI and multiplying the result by 100%. Mean interrater agreement across all instructors was 94.6% (range = 88.6%–100%).

Table 1. Percentage Correct Responses by Instructors on Discrete Trial Teaching Theoretical Assessment Before and After Training.

	Pre-Training	Post-Training	
Skill Area	Mean (SD)	Mean (SD)	*t*
Work Session Preparation/Conclusion	5.00 (7.56)	52.50 (28.66)	4.61**
Technical Skills	20.88 (6.88)	76.88 (13.83)	11.36**
Student Engagement/Management	54.13 (29.24)	83.38 (19.84)	2.51*

Note. N = 8; *p < .05, **p < .01

Results

Effects of Training on Instructor Knowledge and Performance

Pre- and posttraining DTA scores for the eight instructors are presented in Table 1. Paired-samples *t* tests indicated that instructor DTT knowledge increased significantly across each of the three skill areas following the 8-hr training.

Pearson product–moment correlational analyses were conducted to determine whether DTA scores were associated with actual DTT performance of instructors following training and prior to receiving performance feedback. DTA Work Session Preparation/Conclusion scores were strongly correlated with DCCI Work Session Preparation/Conclusion scores on instructors' first days working with students, albeit not at a statistically significant level, $r(8) = .63$, $p = .09$. Similarly, DTA Technical Skills scores were moderately, but not significantly, correlated with DCCI Technical Skills scores on instructors' first days working with students, $r(8) = .51$, $p = .19$. In contrast, DTA Student Engagement/Management scores were inversely, but not significantly, correlated with DCCI Student Engagement/Management scores, $r(8) = -.24$, $p = .57$.

Instructor DTT Performance Across Time

Figure 1 shows the percentage of DTT and support skills exhibited at satisfactory levels (i.e., 90% or better) by the eight instructors when working with students with autism across six sessions. Following the 8-hr training, instructor proficiency scores on the DCCI in session 1 ranged from 60% to 100% (M = 77.50%) in the area of Work Session Preparation/Conclusion, from 37% to 79% (M = 56.63%) in the area of Technical Skills, and from 33% to 100% (M = 70.75%) in the area of Student Engagement/Management. As seen in Figure 1, mean instructor proficiency scores improved relative to baseline across the six sessions in all three skill areas. However, significant variability in proficiency was observed across individual instructors and time within and across the three skill areas. After being provided corrective feedback orally and in writing with the DCCI following five work shifts, instructor proficiency in Session 6 ranged from 70% to 100% (M = 86.67%) in Work Session Preparation/Conclusion, from 68% to 95% (M = 80.67%) in Technical Skills, and from 50% to 100% (M = 72.30%) in Student Engagement/Management.

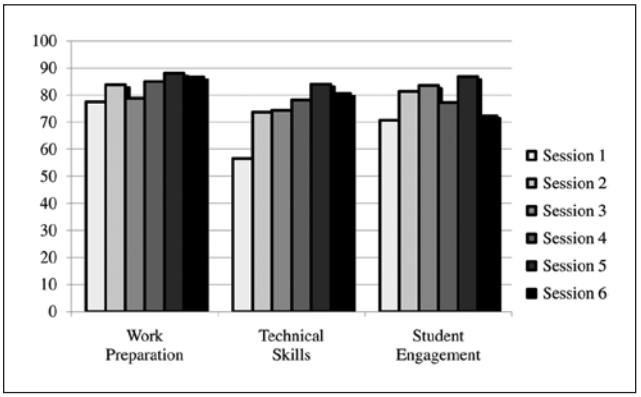

Figure 1. New instructor discrete trial teaching performance across time.
Note. Percentage of discrete trial teaching and support skills displayed at 90% proficiency or better by instructors across Sessions 1 through 6.

Instructor DTT Technical Skills Across Time

Figure 2 shows the mean percentage of DTT Technical Skills exhibited at satisfactory levels (i.e., 90% or better) by the eight instructors when working with students with autism across six sessions. Following the 8-hr training, instructor proficiency scores on the DCCI in Session 1 ranged from 40% to 100% (M = 75%) in the area of Discriminative Stimulus, from 0% to 100% (M = 60%) in the area of Reinforcers, and from 33% to 83% (M = 52%) in the area of Prompting. As seen in Figure 2, mean instructor proficiency scores improved relative to baseline across the six sessions in all three technical skill areas. However, significant variability in proficiency again was observed across individual instructors and time within and across the three technical skill areas. After being provided corrective feedback orally and in writing with the DCCI following five work shifts, instructor proficiency in Session 6 ranged from 70% to 100% (M = 93.75%) in the area of Discriminative Stimulus, from 80% to 100% (M = 93.33%) in Reinforcers, and from 67% to 83% (M = 77.67%) in the area of Prompting.

Discussion

We had several purposes in conducting this study. The first was to evaluate the effectiveness of the training and supervision procedures that were efficacious in the Downs, Downs,

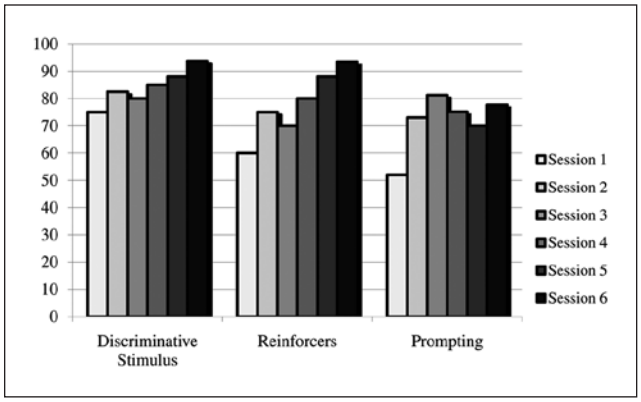

Figure 2. New instructor technical skill performance across time.

Note. Percentage of discrete trial teaching Technical Skills displayed at 90% proficiency or better by instructors across Sessions 1 through 6.

and Rau's (2008) study when applied in real-world conditions that more closely resembled those in which many children with autism receive intervention. We also sought to extend the research literature on DTT training by examining the effects of training and supervision on instructor knowledge and performance of DTT and support skills within three specific domains (DTT Technical Skills, Work Session Preparation/Conclusion, and Student Engagement/Management), allowing for an evaluation of which aspects of providing DTT in real-world settings were most challenging for new instructors. Finally, we evaluated which of the basic DTT Technical Skills (discriminative stimulus, reinforcement, prompting) was most challenging for instructors to learn and display correctly over time. To do so, we utilized a comprehensive checklist, the DCCI, to examine the effects of training and supervision on instructor performance of DTT in a community-based classroom when working with children with autism *in vivo*.

This is the first study we are aware of that has reported results from a theoretical assessment of instructor knowledge used as part of a DTT training program. As expected, the results are interpreted to conclude that the 8-hr training session led to large increases in participants' knowledge of how to implement DTT with children with autism. However, posttraining knowledge scores were far from perfect suggesting the possibility that new instructors who are provided an in-service type training in DTT may leave such a training without a comprehensive understanding of the various technical and support skills required to implement DTT effectively. Posttraining scores in the domain of Work Session Preparation/Conclusion were particularly low. This is an important finding because most researchers examining the effects of training on new instructors' readiness to implement DTT have focused somewhat narrowly on assessing only the DTT Technical Skills (Belfiore et al., 2008; Bolton & Mayer, 2008; Leblanc et al., 2005; Ryan & Hemmes, 2005; Sarakoff & Sturmey, 2004). The results of this study highlight the need for training that focuses explicitly on not only the specific DTT Technical Skills but also on support skills such as selecting and organizing curricular materials and accurately tracking which skills are in the mastery or acquisition phase. Furthermore, the results strongly suggest the need for additional support and supervision *in vivo* post-training.

When evaluating how instructor knowledge was related to actual performance when working with children with autism, we found that instructors' posttraining knowledge scores on the DTA were moderately to strongly correlated with their performance in Session 1 in the areas of DTT Technical Skills and Work Session Preparation/Conclusion. These results suggest that a knowledge assessment such as the DTA may have some value when training new instructors to provide DTT to children with autism. Such an assessment may be particularly helpful as an adjunct to the performance assessments typically utilized in trainings, as it would allow trainers to assess new instructor knowledge of skills and procedures that are not readily observed in a time-limited training session where children with autism are not present (e.g., reviewing previously written clinic notes before sessions, ignoring inappropriate student behavior when applicable). Use of an assessment such as the DTA also may help community-based intervention programs to reduce the significant costs associated with providing intensive and ongoing performance feedback to numerous instructors by providing an alternative, complementary method of assessing instructor competency.

In contrast to the apparent relationship between instructor knowledge and performance in the areas of Work Session Preparation/Conclusion and DTT Technical Skills, posttraining DTA scores were weakly correlated with instructor performance in the area of Student Engagement/Management. This result suggests that effectively managing student behavior is a skill area where knowledge may not translate into performance when new instructors are working with children with autism who may display a range of challenging behavior that can vary significantly across students and time. Because of this, many new instructors are likely to need additional posttraining supervision and support specifically focused on helping them to engage with students with autism in such a way that will allow them to properly implement the DTT Technical Skills they have learned in training.

The results from the performance assessments conducted in this study further reinforce the notion that training and supervision of new instructors should intentionally focus on not only the basic DTT Technical Skills but also the support skills needed to prepare for and conclude DTT sessions and to manage challenging student behavior. Consistent with the results of the Downs, Downs, and Rau's (2008) study, the instructors in this study were not displaying high levels of proficiency in any of the three DTT technical and support skill areas immediately following training. Unfortunately, in the absence of the extremely high level of supervisory support that was present in the Downs, Downs, and Rau's study, the instructors in this study continued to display some inconsistency across all three of the skill areas assessed throughout

the study. Indeed, the mean instructor proficiency ratings in this study never reached the 90% level that was achieved relatively quickly in the Downs, Downs, and Rau's study, suggesting that training procedures that are proven efficacious in more tightly controlled settings may not generalize as well as would be hoped for in real-world classrooms where children with autism actually receive services. As early intervention programs for children with autism continue to proliferate and use DTT as an intervention tool, it will be absolutely critical to further examine the extent to which training and supervisory procedures lead to desired instructor performance of the entire range of DTT and support skills in classrooms where children with autism are served.

Our final purpose in this study was to evaluate which of the specific DTT Technical Skills were most difficult for new instructors to learn. The vast majority of studies examining DTT training have reported aggregated assessment data across all of the various DTT Technical Skills (Arnal et al., 2007; Babel, Martin, Fazzio, Arnal, & Thomson, 2008; Belfiore et al., 2008; Bolton & Mayer, 2008; Fazzio et al., 2009; Downs, Downs, & Rau, 2008; Gilligan et al., 2007; Sarakoff & Sturmey, 2004; Thomson et al., 2009). Because of this focus on the DTT procedures as a whole, little is known about which of the DTT Technical Skill areas (discriminative stimulus, reinforcement, and prompting) may require more attention when training and supervising new instructors. Following training, the instructors were not displaying high levels of competency in any of the three technical skill areas, with prompting procedures proving particularly challenging (i.e., 52% correct across instructors). After 2 months of providing DTT in the classroom and receiving individual supervision and performance feedback during five sessions, the instructors were displaying more than 90% of correct performance in the technical skill areas of discriminative stimulus and reinforcers. However, mean instructor performance in the area of prompting reached 80% accuracy in only one of the six sessions. These results are interpreted to suggest that prompting procedures are the most difficult for new instructors to learn and implement consistently over time and should receive extra attention when training and supervising new DTT instructors.

Despite providing some useful data on the effects of training and supervision on new DTT instructors in a community-based setting, this study had some limitations. First, the study was limited by the small sample size that reduced statistical power and the ability to generalize the results. The study was further limited by the absence of an analysis of how instructor competence affected child learning. Previous work has indicated that child learning improves as instructor competence improves (Downs, Downs, & Rau, 2008); however, future studies are needed to replicate those findings. Another limitation of this study was the low number of sessions during which two raters were available, thus limiting opportunities to assess interrater agreement on the DCCI to a very low percentage of the overall number of implementation days. Although interrater agreement was high in this study (94.6%) and the Downs, Downs, and Rau's study (97%), future researchers should strive to conduct more frequent ratings of new instructors to provide further evidence of interrater reliability for the DCCI.

Conclusion and Recommendations

DTT is an instructional strategy with demonstrated ability to facilitate learning and development in children with autism (Lovaas, 1987; McEachin et al., 1993; Smith, 1999) and other developmental disabilities (Downs et al., 2007; Downs, Downs, Fossum, et al., 2008). As educators and paraeducators seek to use DTT in community-based settings, it is critical that they receive the training and supervision needed to allow them to implement DTT in the manner in which it has proven effective. Based on the results of this study, we make the following recommendations for programs training individuals to provide DTT to young children with autism and other developmental disabilities.

1. In-service or similar trainings in DTT must be supplemented by performance feedback that is provided to new instructors after they begin implementing DTT in classrooms with children with autism. Providing training without any subsequent supervision and performance feedback almost certainly will result in less than optimal instruction and student learning.
2. Knowledge assessments such as the DTA may be used as part of training and supervision when providing ongoing (i.e., daily or weekly) intensive individual supervision and performance feedback is not possible. Importantly, such knowledge assessments should be used as an adjunct to, not a substitute for, performance assessments.
3. DTT trainers and supervisors should intentionally and systematically train and provide feedback to new instructors across the full range of skills needed to implement DTT (Work Session Preparation and Conclusion, DTT Technical Skills, and Student Engagement and Management).
4. Trainers and supervisors should pay particular attention to new DTT instructors' ability to correctly use prompting procedures, as these appear to be the most difficult of the DTT Technical Skills for new instructors to learn and implement consistently.

Implementation of these recommendations has the potential to help ensure that community-based intervention programs that wish to use DTT are able to do so in the manner in which such methods have proven effective. By improving treatment integrity in this way, professionals working with young children with autism can help to bridge the gap between research and practice. More importantly, using training and supervision procedures that maximize instructor competency will very likely help to improve the developmental and educational outcomes of children with autism who are served in community-based intervention programs.

Appendix

Discrete Trial Teaching Competency Checklist for Instructors (DCCI)

Instructor: _____ Date:_____ Supervisor:_____

0 = Unsatisfactory (less than 50% correct)
1 = In Progress/Needs Improvement (50%–90% correct)
2 = Satisfactory (more than 90% correct)

Work Session Preparation/Conclusion
_____Sign in for work session
_____Read behavioral notes before session begins
_____Check program checklist to see what you will work on with student
_____Within each program check "Current Items" and select appropriate items
_____Be prepared with all materials before students arrive and before initiating each program
_____Program checklist completed
_____Record date and number of hours worked with student on sign-in sheet
_____Check for and record any mastered/newly introduced items
_____Complete behavioral notes at end of shift (description of student's behavior, successful and unsuccessful programs, free play activities, effective reinforcers)
_____Put away all materials at end of shift

DTT Technical Skills
Present S^D correctly in each program/item
_____1. Child attending
_____2. S^D is clear, concise, uninterrupted
_____3. S^D is consistent (presented the same way every time)
_____4. S^D is NOT repeated
_____5. Give student approximately 3 to 5 seconds to respond
Consequences used correctly in each program/item
_____1. Deliver reinforcing stimulus (S^R) immediately following correct responses
_____2. Primary reinforcers accompanied by social reinforcers
_____3. Use effective reinforcers (child responds positively to reinforcer)
_____4. Use "no" correctly
_____5. Only reinforce correct responses
Correct prompting/prompt fading procedure followed in each program
_____1. Timing: prompt given immediately following S^D
_____2. Least intrusive prompt used
_____3. Prompted trial followed by nonprompted or reduced prompt trial
_____4. Prompts faded appropriately (less intrusive, removed)
_____5. Avoid inadvertent prompts
_____6. Prompts used to avoid repeated failures
_____Trials paced correctly ((1 to 3 seconds in between trials)
_____Avoid excessive verbalizations when interacting with students at acquisition level
_____Data collection correct

Student Engagement/Management
_____Ignore inappropriate student behavior when applicable
_____Reinforce appropriate student behavior
_____Follow-through with all instructions given to student
_____Give redirection instruction for off-task student behavior and follow through as needed
_____Engage appropriately with students (do not use verbal or physical aggression with students)
_____Reinforce student attention and effort

Acknowledgment

The authors thank the families, children, and staff who participated in the study, as well as the research assistants who provided instructional services and collected data.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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