



Effectiveness of the Embedded Instructions Provided by Preschool Teachers on the Acquisition of Target Behaviors by Inclusion Students *

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Abstract

The purpose of the present study was to examine the effects of the embedded instruction provided by preschool teachers to students with developmental disabilities (DDs) in their classes on the acquisition of target behaviors. The first author provided teacher training to four preschool teachers regarding providing instruction by using embedded instruction presented by a simultaneous prompting procedure. After completing the teacher training, the preschool teachers provided instructions to their four children with DD regarding their target behaviors. A multiple probe design with probe trials across dyads was used in the study, which is one of the models of single-subject experimental designs. The results revealed that the teachers were able to prepare their embedded instruction plans correctly, implement the prepared plans with high procedural fidelity, and maintain their instruction skills. In addition, the teachers were able to generalize their skill of preparing embedded instruction plans presented via simultaneous prompting procedures across different discrete behaviors. The children with DDs in regular education classes were able to acquire their target behaviors through the instruction provided by their teachers and were also able to realize maintenance and generalization regarding their target behaviors. In the social validity data, teachers and parents presented positive opinions regarding the study, and the children with DDs were able to reach the performance levels of their typically developing peers.

Keywords

Preschool teacher training
Embedded teaching
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Introduction

The number of children with developmental disabilities (DDs) who receive education together with their peers in regular education settings is increasing in Turkey, following the global trend (McDonnell, Johnson, & McQuivey, 2008; Ministry of National Education [MoNE], 2013-2014; 2017-2018; Özen, Ergenekon, Genç, & Ülke-Kürkçüoğlu, 2013; Sakız & Woods, 2015). Due to this increase, it is very important for regular education teachers to use effective teaching methods that are coherent with classroom routines and are evidence-based during the implementation in the classroom to meet the needs of children with DDs. However, many research studies in the literature have revealed that teachers face various problems when attempting to provide effective teaching methods that are coherent with the teaching approaches used regularly in the classroom and are planned according to the needs of children with DDs in inclusion environments (Horn, Lieber, Li, Sandall, & Schwartz, 2000; Johnson, McDonnell, Holzwarth, & Hunter, 2004; Riesen, McDonnell, Johnson, Polychronis, & Jameson, 2003). As a solution to these problems, it is suggested that implementers and parents use a naturalistic instructional approach that can be used effectively in community settings in both special and regular education classes, as well as in home environments, to teach different target behaviors to children with DDs (Horn et al., 2000; Johnson et al., 2004; McDonnell, 1998; McDonnell et al., 2008; Özen et al., 2013; Riesen et al., 2003; Tate, Thompson, & McKerchar, 2005).

Since the naturalistic instructional approach is appropriate for the routines and characteristics of regular education classes, it is easily used throughout the day by preschool teachers without causing delays (National Autism Center [NAC]; 2015; National Professional Development Center on Autism Spectrum Disorders [NPDC], 2014; Özen et al., 2013; Özen & Ergenekon, 2011; Pretti-Frontczak & Bricker, 2004; Rakap, 2017a). Embedded instruction is one of the implementation procedures taking place under a naturalistic instructional approach. In embedded instruction, teaching implementations are taught by placing (embedding) them into daily routines, planned activities, play activities and/or transitions. With this characteristic, embedded instruction provides an opportunity for children to acquire and use essential and functional target behaviors in meaningful contexts (Grisham-Brown, Hemmeter, & Pretti-Frontczak, 2005; Özen & Ergenekon, 2011; Pretti-Frontczak & Bricker, 2004; Snyder, Rakap, Hemmeter, McLaughlin, Sandall, & McLean, 2015). When compared with structured instruction, embedded instruction is more useful for children with DDs regarding teaching and evaluation of functional behaviors. In embedded instruction, the child is involved in the activity in the natural setting where the activity is being realized. Since this provides maintenance and generalization of the acquired behavior, it is very important and useful for the child (Koegel, Vernon, & Koegel, 2009; Rakap & Parlak-Rakap, 2011; Schepis, Reid, Ownbey, & Parsons, 2001).

If preschool teachers want to use embedded instruction in regular education environments, they should move to the implementation stage after planning the procedure carefully. In this phase, preschool teachers should decide on the (a) target behavior, (b) effective feedback, (c) the prompt to be used, (d) the time interval to be provided for the child to present the behavior, (e) the daily routines, activities, play activities and/or transitions in which embedded instruction trials will be realized, (f) the criteria and trial distribution, and (g) the teaching method to be used to deliver the embedded instruction to the child. After making these decisions, teachers should collect baseline data regarding the performance level of the child regarding the target behavior and determine the changes in the child's performance level after providing the instruction to observe the effect of the instruction (Grisham-Brown et al., 2005; McDonnell et al., 2008; Noonan & McCormick, 2006; Pretti-Frontczak & Bricker, 2004). After following each step correctly, preschool teachers should implement the prepared plan systematically and consistently (McDonnell et al., 2008). However, it is evidenced by many studies in the literature that preschool teachers and teachers at other stages of regular education have deficiencies in terms of the knowledge and use of evidence-based implementations and methods (Çelik, 2019; Kalkan, 2019; Schepis et al., 2001; Tate et al., 2005; Tunç-Paftalı, 2018; Ünal, 2018). The problems faced

by preschool teachers are reported as a lack of skills in systematically implementing special strategies, methods and techniques by making needed accommodations in addition to the lack of knowledge (Bakkaloğlu, Yılmaz, Altun Könez, & Yalçın, 2018; Çelik, 2019; Değirmenci, 2018; Horn et al., 2000; Macy & Bricker, 2007; Snyder, Rakap, Hemmeter, McLaughlin, Sandall, & McLean, 2015; Sucuoğlu, Bakkaloğlu, İşcen Karasu, Demir, & Akalın, 2014). At this point, preschool teachers need to acquire the knowledge and skills necessary to use teaching strategies that are coherent with the educational programs they already use and which can also be used within the daily routines, activities, play activities and/or transitions while being used with children with DDs. According to the literature, regular classroom teachers attempt to meet these needs for knowledge and implementation experiences through teacher trainings and/or in-service training programs (Çelik, 2019; Diken & Batu, 2013; McDonnell et al., 2008; Özaydın & Çolak, 2011; Tate et al., 2005). However, since teacher trainings and/or in-service trainings occur only once and teachers are viewed as passive information collectors in these programs, they fail in meeting the needs of the teachers and, consequently, those of the children. For teachers to transfer the information provided to them into skills and implement the knowledge gained with high levels of treatment integrity, they should be provided with interactive implementation support and appropriate feedback in their classes (Bruder, 2016; Değirmenci, 2018; Kalkan, 2019; Snyder, Hemmeter, & Fox, 2015; Snyder, Hemmeter, & McLaughlin, 2011; Winton, 2016).

The results of the studies in the literature reveal that preschool teachers who take part in teacher training can use embedded instruction in their classes easily and successfully (Grisham-Brown, Schuster, Hemmeter, & Collins, 2000; Horn et al., 2000; Rakap, 2017b; Schepis et al., 2001; Toelken & Miltenberger, 2012; Ünal, 2018). Correspondingly, the performance levels of children with DDs regarding the behaviors they need for learning increase (Macy & Bricker, 2007; Snyder, Rakap, Hemmeter, McLaughlin, Sandall, & McLean, 2015; Snyder, Hemmeter, & Fox, 2015). Children with DDs who benefit from inclusion implementations are able to learn in less restrictive environments with their typically developing peers, and they present similar performance characteristics with their peers regarding their target behaviors.

The acquisitions gained by children with DDs during preschool years have critical importance during the rest of their learning process so that they can reach their maximum potentials (Bakkaloğlu, 2020). In such an important and critical point in their lives, learning with their peers will open a door that will help them obtain the highest benefit from their future educational settings. In the studies in the literature, it has been mentioned that after completing teacher training, the implementers could successfully teach different target behaviors to children (Grisham-Brown, Pretti-Frontczak, Hawkins, & Winchell, 2009; Rakap, 2017b; Tate et al., 2005; Toelken & Miltenberger, 2012; Ünal, 2018; Wolery, Anthony, Caldwell, Snyder, & Morgante, 2002). The present study, which was conducted in such a context, to the best of the authors' knowledge, is the first study in Turkey and one of a limited number of studies in the world literature in which teachers applied the methods in inclusion settings. Therefore, this study is one of the firsts to provide an important example for implementers to show that the teachers who develop their skills and behaviors to realize effective teaching can systematically implement these skills in their classes.

In the literature related to teacher training, there are limited data regarding the maintenance, generalization, and social validity of teachers' acquired knowledge and skills (Rakap & Balıkçı, 2016; Snyder, Rakap, Hemmeter, McLaughlin, Sandall, & McLean, 2015; Tate et al., 2005). In this study, social validity data were collected by social comparisons with typically developing peers and by subjective evaluations from both teachers and children with DDs. In addition, maintenance, generalization and social validity data were also collected from both teachers and children with DDs in the present study. The present study extends and contributes to the literature by providing data collected from both children and teachers. Thus, the purpose of the study was to examine the effectiveness of the embedded

instruction provided by the simultaneous prompting procedure provided by preschool teachers to children with DDs in their classes on their learning of target behaviors.

Research Question 1: Can preschool teachers respond 100% correctly to the control list of embedded instruction provided by simultaneous prompting, write the embedded instruction plan with 100% accuracy and implement the written plan with a high treatment integrity rate?

Research Question 2: Can teachers maintain their skills regarding implementing the embedded instruction provided with simultaneous prompting five weeks after the treatment was completed and generalize an embedded instruction plan for writing skill across a different discrete behavior?

Research Question 3: Is the training provided to children with DDs effective in terms of the acquisition of their target behaviors, on maintaining the behaviors 1, 4, and 8 weeks after the intervention was completed and on generalizing these behaviors across different settings, people and materials?

Research Question 4: Can children with DDs reach the performance levels of their typically developing peers regarding the target behaviors planned to be taught to them?

Research Question 5: What are the opinions of preschool teachers regarding the “teacher training package” implementation procedure, the training they provided to their students with DDs in their classes, and the opinions of parents of children with DDs regarding the study?

Method

Participants, Researchers, Observer and Settings

Preschool teachers. Four preschool teachers who had students with DDs in their classes and that were working in preschools affiliated with the Ministry of Education participated in the study. In this phase, the preschools in the city center of Eskisehir were chosen. Afterwards, the principles of the preschools were called, and the aim of the present study was described to them. The principles that responded positively to the study provided information on the teachers at their schools who had students with DD in their classes. Then, appointments were made with the principals and teachers, and the necessary information was provided in person. Out of the schools willing to participate in the study, four preschools and four teachers and their students with DDs were selected. Following the sample selection, ethical board permission and implementation acceptance were obtained from the Ministry of Education. The teachers called the parents of the children with DDs and provided them with detailed information regarding the aim of the study, and written consent was obtained. To participate in study, the teachers had to meet the following prerequisites: (a) have an undergraduate degree with four years of preschool teacher education, (b) be working for 10 years at the most, (c) be willing to participate in the study, (d) be willing to accept the researcher in his/her class, (e) be willing to work collaboratively with the researcher who presented the training package, (f) be willing to participate regularly in the program presented to them, (g) be willing to complete the responsibilities on time with the requested criteria, and (h) give permission for video recording to occur during the study. Four female teachers who met all the prerequisites were included in the study. The information regarding the teachers is presented in Table 1.

Table 1. Characteristics of the Preschool Teachers

Participant Teachers	Gender	Age	Work Experience (years)	Work Experience with Students with DDs	Total Students	Number of students with DDs	Special Education Course
Teacher Nilay	F	28	7 yrs	2 yrs	18	1	Did not
Teacher Feraye	F	28	6 yrs	3 yrs	26	3	Took
Teacher Zehra	F	32	10 yrs	First time	21	1	Took
Teacher Gökçe	F	30	8 yrs	4 yrs	16	3	Did not

Children with DDs. One student with a DD from each teacher's class participated in the study. *Zeren* was a girl with a mild intellectual disability, speech and language disorders, a continuing illness, and an orthopedical disability. Her chronological age was five years seven months. She had been affiliated with the preschool for two years and took part in the small group training in the Implementation Unit of a university. She had difficulty engaging in eye contact with others. She could follow directions containing three-four words. She could use three worded sentences to express herself. She could count rhythmically from 1 to 5. She could count one, two, and three objects from object groups. She could identify circles and squares out of two different shapes. She could name the asked colors. The chronological age of *Deniz* was six years four months. *Deniz* was a boy with Down Syndrome. He benefited from inclusion implementation at a preschool for two years and was attending small group training in a university's implementation unit. *Deniz* could follow directions containing two to three words. He could use one and two word sentences to express himself. He could point to a named object with his finger from the objects that he knew. He could also point to large and small objects when asked. *Firat* was a boy with a mild intellectual disability diagnosed with Down syndrome. His chronological age was five years one month. He had also been participating in an inclusion implementation at a preschool for two years and participated in small group training administered by the Implementation Unit of a university. *Firat* could follow two-three word directions. He could use two word sentences to express himself. He could count rhythmically from 1 to 3. He could identify large and small objects when asked. *Nehir* was a girl with a mild intellectual disability diagnosed with cerebral palsy. Her chronological age was six years nine months. She had been attending inclusion implementation at a preschool for three years. She could understand and follow four- to five-word directions. She could also use four- to five-worded sentences to express herself. She could identify long-short, fat-thin, big-small and could identify colors out of two objects. The information on the children participating in the study is presented in Table 2.

Table 2. Characteristics of the Children with DDs

Participant Children	Age	Diagnosis
Zeren	5 years 7 months	Mild intellectual disability, speech and language disorders, continuing illness, orthopedic disease
Deniz	6 years 4 months	Down syndrome, moderate intellectual disability
Firat	5 years 1 month	Down syndrome, mild intellectual disability
Nehir	6 years 9 months	Cerebral Palsy, mild intellectual disability

Researchers. The first author planned the study, performed teacher training with the participating teachers, collected and analyzed the research data, and reported the study with the guidance of the second author. The first author of the study received her undergraduate degree from a special education department, majoring in the education of individuals with hearing-impairments and her graduate degree major focused on the education of individuals with intellectual disabilities. During the time that the study was conducted, the first author was working as a research assistant and was continuing her PhD degree with a focus on the education of individuals with intellectual disabilities. She is currently working as an assistant professor.

The second author's undergraduate, graduate and doctoral degrees focused on the education of individuals with intellectual disabilities. She is currently working as a professor teaching students with education of individuals with intellectual disabilities majors. The second author is conducting undergraduate and graduate courses, and she is also conducting research projects and supervising graduate theses. The second author supervised the first author during the planning, conducting and reporting phases of the study and provided feedback.

Observer. The reliability data of the study were collected by a research assistant who had her undergraduate and graduate degrees with majors focusing on the education of individuals with intellectual disabilities. During the time that the study was conducted, the observer was continuing her PhD degree with a major in the education of individuals with intellectual disabilities. She had

experience in conducting research and implementing embedded instruction provided by simultaneous prompting.

Setting

The teacher training was provided at the schools of the participant teachers before starting the experimental phase of the study. The teachers implemented the embedded instruction implementation phase with children with DDs in the classrooms, restrooms, and food courts of their school, whereas they conducted the daily probe sessions in an available spare classroom in the school. Generalization sessions across settings and people were conducted in the study, and these sessions were conducted by the first author of the study. These sessions were conducted in the principle's room with one child and in the classrooms of the implementation unit of the university.

Materials

The researchers prepared written, visual and real object materials to present the training on providing embedded instruction by using simultaneous prompting for preschool teachers. These materials included (a) a control list prepared for evaluating the information levels of teachers regarding writing embedded instruction plans, (b) a control list prepared for evaluating the written embedded instruction plans of the teachers, (c) two informative handbooks prepared regarding simultaneous prompting procedures and embedded instruction, (d) a PowerPoint presentation that included the information in the informative handbooks, (e) concept teaching sets for presenting example trainings, (f) video recordings of example implementations involving the information in the handbooks, and (g) technical equipment, such as laptops, cameras and tripods.

The teachers used various materials exemplifying the concepts to be taught to teach their target behaviors to the children in their classes with DDs. The first author and the teachers prepared these materials together. During this procedure, the teachers prepared five sets of materials with the same types of objects regarding the child's target behavior with the first author's supervision. Additionally, the teachers used the data collection forms prepared by the researchers and pencils to record the responses of the children.

Teacher Training Procedure

The teacher training was conducted one-to-one and face-to-face with each teacher by the first author. The teacher training was performed in November and December of the fall semester of the 2015-2016 school year. These trainings were conducted with each teacher separately, and each training consisted of two sessions of almost three hours conducted on different weekdays. The teacher trainings were also conducted outside of the normal working hours of the participant teachers. During the study, the researcher talked with the teachers and determined the sequence of the teacher implementations. Therefore, teacher training started with the first teacher, who provided training to her student with a DD first. At the beginning of the session, the researcher implemented the control list prepared by the researchers according to the literature to evaluate the knowledge level of the preschool teachers regarding simultaneous prompting and embedded instruction. Afterwards, teachers were asked to write an embedded instruction plan. The researchers evaluated the knowledge levels of the teachers regarding the embedded instruction and written embedded instruction plans by using the control lists they prepared according to the literature.

The first researcher then provided the teacher training package to the first participant teacher. She provided the teacher with informative handbooks on simultaneous prompting and embedded instruction and presented PowerPoint presentations involving the information in the handbooks. After the PowerPoint presentations, the teacher watched videos on the implementation of the simultaneous prompting procedure and embedded instruction. After watching the videos, the teacher and first author engaged in role playing using the example concept teaching sets. During the role playing, out of the material sets prepared by the first author for teacher training regarding different concepts, one set was selected by the teacher. In this phase, first, the first author played the "teacher" role, the preschool teacher played the "child" role, and they engaged in an example concept teaching session. After that session, another example concept teaching session was conducted in which the teacher played the

“teacher” role and the first author played the “child” role. During the role playing implementations, the first author provided prompts when needed and feedback. During the teacher training procedure, the first author provided verbal praise for the correct responses of the teacher, whereas she provided error correction for the incorrect responses. Finally, the first author collected posttest data from the teacher regarding both the knowledge level control list and the embedded instruction plan control list. The researchers evaluated the plan written by the teacher by using the control lists they prepared according to the literature. The criteria for the teachers to begin implementing the embedded instruction were 100% correct responses for the knowledge level control list and 100% correct responses for the writing embedded instruction plans.

Dependent, Independent Variables and Research Design

The independent variable of the study was the implementation of the preschool teachers’ embedded instruction provided by the simultaneous prompting procedure after taking the teacher training provided to them. However, the dependent variable of the study was the percentage of correct responses given by the participant children regarding their target behaviors (Zeren - pointing to the thick object; Deniz - pointing to the full object; Firat - pointing to the blue object; Nehir - pointing to the far object) after being provided with the implementation of the embedded instruction procedure.

To examine the effectiveness of embedded instruction provided by simultaneous prompting provided by preschool teachers, one of the single-subject designs, i.e., “a multiple probe design with probe trials across dyads (teacher-child with DD)”, was used in the study. The multiple probe design with probe trials across dyads model is a model that examines the effectiveness of one independent variable on at least three dyads (Gast, Lloyd, & Ledford, 2014; Tekin-İftar, 2012).

First, three decisive baseline data points were collected consecutively from the first participant dyad. During the collection of the baseline data from the first dyad, by performing probe trials with the other three dyads, one probe session data point was collected. After reaching three decisive baseline data points, the training phase was started with the first dyad. When the first dyad performed with 100% accuracy on the target behavior for the first time, a probe session was conducted with the other three dyads. When the first dyad performed with 100% accuracy for three consecutive sessions, baseline data started to be collected from the second dyad until three decisive data points were collected from them, and then the training sessions began to be conducted with them. Similar procedures were followed with the other dyads. Experimental control was secured by having a change in the level of responding for only the child with whom the intervention was started and not having any change in the other children’s level of responding, and this change was observed in the other participant dyads due to the diachronic principle (Gast et al., 2014; Tekin-İftar, 2012).

Some planning was performed to control the factors that could affect the internal validity in this study, which was realized by a multiple probe design with probe trials across dyads. Within this context, to control the *external factors*, the people around the child were informed about the target behavior of the child and were instructed not to engage in any behaviors that could result in the child’s learning of her/his target behavior. The study attempted to continue for the shortest time possible to control the *maturation factor*. The *measuring factor* was controlled by collecting data from at least 30% of the whole session for interobserver reliability and treatment integrity. The *participant loss factor* was controlled by starting the study with four teacher and four child dyads. The *participant selection partiality* was controlled by comparing the data collected from the participants before and after the interventions.

Target Behaviors and Data Collection

To determine “the knowledge levels of preschool teachers regarding embedded instruction provided by simultaneous prompting”, the researchers prepared a control list with seven items according to the literature. Next to each of these seven items, boxes written “Yes”, “No”, “Missing” and “Explanation” were placed, and the teachers were instructed to check the box mentioning their opinion regarding that item. If the teacher checked the “Yes” box, it was accepted as “correct”, since that meant the teacher had the knowledge of that item. “No” and “Missing” boxes were accepted as “incorrect” because they meant either the teacher did not have the all the necessary knowledge or s/he had no

knowledge about the item. The researchers also prepared another control list involving “the steps to be considered while writing the embedded instruction plan”, again according to the literature to determine if the teachers could write the embedded instruction provided by the simultaneous prompting procedure plans correctly. The teachers’ embedded instruction plans were controlled by using the seven-item control list provided by the researchers.

The researchers used observational event recording to determine the responses of both the children with DDs during the embedded instruction procedure and the typically developing children during the social comparison sessions. The researchers also conducted semi structured interviews with the teachers to evaluate the teacher training procedure. Nine open-ended questions were prepared to collect the social validity data of the study. In addition, the researchers collected data from the parents of the children with DDs to determine their opinions about the appropriateness of the purpose, method used, procedure followed and results obtained by using subjective evaluation. According to this purpose, a questionnaire form with eight close-ended and five open-ended questions was used to collect social validity data from the parents.

General Procedure

Probe Sessions. During the study, three types of probe sessions—baseline, daily and intermittent probe sessions—were conducted. The *baseline probe sessions* were conducted on the floor or on the table according to the child’s preference. During the probe sessions, the teacher told the child, “Now, let’s play. First, we will point to the ‘thick (full, blue, far)’ objects and then put them in the box. Are you ready to play?”. Afterwards, the teacher asked the child, “Which one is thick (full, blue, far)?”. Then, she recorded the response of the child on the data collection form as a correct or incorrect response. The teacher followed the same procedure during the intermittent and daily probe sessions.

Training Sessions. During the training sessions, the teacher provided instructions according to the embedded instruction plan she wrote that was considered appropriate for the target behavior of the child with a DD. In the first dyad, teacher Nilay provided training for pointing to the “thick” objects with Zeren. In the second dyad, teacher Feraye provided training for pointing to the “full” objects with Deniz. In the third dyad, teacher Zehra provided training for pointing to the “blue” objects with Fırat, and in the fourth dyad, teacher Gökçe provided training for pointing to the “far” objects with Nehir. The teachers worked with the children five days during the weekdays and conducted five trials a day. All teachers used “modeling and verbal prompts” as the controlling prompts according to the characteristics of the children. The teachers embedded the trials into the activities, routines, games and/or transitions during the day. For teaching context, teacher Nilay used Turkish language, art and play activities; teacher Feraye used breakfast time, art activities and toilet time; teacher Zehra used school entering time, breakfast time, art and game activities; teacher Gökçe used play activities, breakfast time and reading-writing preparation activities. When the teacher determined the routine, activity, play and/or transition, she would embed the trial; she prepared the setting and materials three to five minutes before starting the training trial. Afterwards, the teacher said, “Fırat, we are going to play with play dough; we are going to shape the dough. We will give shapes to the “blue” dough. Are you ready?”, providing the attention securing prompt. When the child stated that he was ready orally or through his behaviors, the teacher provided reinforcement by saying “You’re super, let’s start then.” Afterwards, the teacher provided the target stimuli by saying “Show me which is blue/Point to blue” and immediately afterwards, she pointed the blue object and said “This is blue”; by doing this, she provided the controlling prompt. She waited for three to five seconds, which is the response interval for the child to respond. If the child modeled the teacher and pointed to the blue object, the teacher said, “You’re super, you pointed to blue” and clapped for the child. If the child did not respond during the response interval or gave an incorrect response, she provided the controlling prompt again and repeated the trial. The teacher praised the child’s attendance in the training trial by saying “You played with the dough very nicely, well done.” The teacher recorded the child’s response and prepared for the next planned trial. The teacher realized the remaining four trials during the day similarly. During the training procedure that the teachers conducted, the first author answered their questions about the procedure and provided feedback to the interventions when needed. The criteria during the study for

the children with DDs were to present three consecutive 100% accurate responses for their target behaviors.

Maintenance Sessions. Maintenance data from both the children and teachers were collected during the study. The teachers collected the *maintenance data of the children*. The teachers conducted the maintenance sessions one, four and eight weeks after the children met their criteria. The procedure that the teachers followed during the maintenance sessions was similar to that of the baseline probe sessions. During this phase, while the teachers were collecting maintenance data from the children with DDs, the first author collected *maintenance data from the teachers*. The first author conducted the maintenance session five weeks after the intervention was completed to determine if the teachers could maintain their skills regarding implementing the embedded instruction provided by the simultaneous prompting procedure.

Generalization Sessions. The researchers collected generalization data to determine whether the children could generalize their acquired target behaviors across different settings and people. The generalization across settings and people sessions were conducted by the first author. The first author conducted the generalization session in the principle's room for Nehir and for Zeren, while Deniz and Firat attended the sessions in the classes of the implementation unit of the university where the children were attending small group meetings. The preschool teachers suggested conducting another generalization session with children with DDs to determine if they could generalize their target skills across different materials. Thus, generalization across materials sessions were conducted by the preschool teachers. During this generalization phase, the researchers asked the teachers to plan and implement the process all by themselves. The process followed in the baseline probe sessions was conducted in the generalization sessions.

The researchers asked the teachers to determine a different concrete behavior from the one they used during training and write an embedded instruction plan for this behavior to evaluate if they could generalize their plan writing skill. The researchers realized this phase by using pre- and posttest evaluations.

Social Validity

The researchers collected social validity data from the following three different groups: typically developing peers, preschool teachers and parents of children. *First*, the first author conducted social comparison probe sessions with the typically developing peers. She collected social comparison data from 20 peers. The procedure followed during the social comparison sessions was the same as that followed during the baseline probe sessions.

A social validity question form was prepared by the researchers to collect the subjective evaluation data. The subjective evaluation data were collected via semi structured interviews conducted by the first author. The purpose of the semi structured interviews was to determine if the implementation was conducted and the instruction provided by the teachers was appropriate and if the results revealed from the study were meaningful regarding the participant teachers and the children with DDs. *Second*, the first author collected the opinions of the parents of the children with DDs regarding the purpose, method, and procedure through a question form that she prepared with eight closed-ended and five open-ended questions. The social validity data collection procedure was completed by conducting social comparisons and subjective evaluations.

Data Analysis

The researchers calculated the "knowledge levels" of the teachers about the embedded instruction they provided by the simultaneous prompting procedure and their "skills of writing embedded instruction plan" data by using their correct responses to the pretest and posttests. They analyzed the effectiveness of embedded instruction on the acquisition of target behaviors by the children by graph analysis, whereas they analyzed the generalization of the acquired behaviors of the children by using pretest and posttest models.

While analyzing the collected data about the implementation skills of embedded instruction of the participant teachers, the researchers calculated the percentage of correct responses of the teachers. In addition, the data used to evaluate whether the teachers could generalize their skills of writing embedded instruction by using a simultaneous prompting procedure plan for teaching different concrete behaviors were analyzed by calculating their correct responses. The researchers also reliably and correctly analyzed the teachers' planning and implementation of the children's generalization across different materials sessions by calculating the correct response percentages.

For the analysis of the data collected during the social comparison sessions conducted with the typically developing peers, the correct response percentage was calculated. The data collected from the preschool teachers by subjective evaluation were analyzed by using content analysis. For evaluating the data of the parents' opinions, descriptive analysis was used.

Reliability Data

Inter Observer Reliability (IOR). The researchers collected interobserver reliability data from 30% of all the sessions of all phases of the study, which were randomly selected. The interobserver reliability data were calculated by comparing the evaluations conducted by the first author and the observer independent from each other and simultaneously from the randomly selected sessions. For the interobserver reliability calculation, the $[\text{Number of Agreements} / (\text{Number of Agreements} + \text{Disagreements}) \times 100]$ formula was used (Ayres & Ledford, 2014; Cooper, Heron, & Heward, 2007).

The interobserver reliability was 100% for all the preschool teachers and children with DDs dyads in all phases. The interobserver reliability for the social comparison was 100% for all dyads in all the social comparison sessions. The interobserver reliability was calculated as 100% for the preschool teachers' embedded instruction plan writing before and after the teacher training. The interobserver reliability was found to be 100% for the preschool teachers' embedded instruction provided by the simultaneous prompting procedure plan writing for a different behavior.

Procedural Fidelity (PF). Out of all phases of the study, 30% of the sessions were selected randomly, and procedural fidelity data were collected from these sessions by the observer. To calculate the procedural fidelity, the $[(\text{Number of observed trainer behavior} / \text{Planned trainer behavior}) \times 100]$ formula was used (Cooper et al., 2007; Gast, 2014).

Zeren's procedural fidelity was found to be 100% for the baseline, generalization and maintenance sessions, 99% (range= 98-100) for the intervention sessions, and 99% (range= 97-100) for the daily probe sessions. Deniz's procedural fidelity was calculated as 100% for the baseline probe, daily probe, intermittent probe, training, generalization across people and settings, and maintenance sessions and 99% (range= 97-100) for the generalization across materials sessions. Firat procedural fidelity was calculated as 100% for the baseline probe, intermittent probe, training, generalization, and maintenance sessions and 99% (range= 97-100) for the daily probe sessions. Nehir's procedural fidelity was calculated as 100% for the baseline probe, daily probe, intermittent probe, generalization, and maintenance sessions and 99% (range= 98-100) for the training sessions. The social comparison procedural fidelity was also calculated as 100% for all the dyads.

Results

Results Regarding Preschool Teachers

A control list to determine the knowledge levels of the teachers regarding embedded instruction was conducted before presenting the teacher training package, and immediately after, they were asked to write an embedded instruction plan. The teachers responded with 0% correct responses to the pretest control list conducted to determine their knowledge levels. After determining the teachers' knowledge levels, they were asked to write an embedded instruction plan. The teachers performed the pretest of writing embedded instruction plans with 0% accuracy. Afterwards, the teacher training package was presented. After presenting the teacher training package, the teachers responded with 100% accuracy to the posttest of the control list conducted to determine their knowledge levels. During the study, the teachers were also asked to write an embedded instruction plan for a different concrete behavior than

the one they taught during training. Hence, the teachers' generalization behavior was determined for writing an embedded instruction plan for a different concrete behavior than the one they taught during training. The teachers were able to write the embedded instruction plan provided by simultaneous prompting for a different concrete behavior with 100% accuracy.

The teachers implemented the generalization across materials sessions for the children as a posttest by themselves. These sessions were evaluated by the researchers. According to the evaluation results, the teachers were able to implement the generalization across materials sessions with a 99% (range= 97-100) accuracy level.

The first author collected maintenance data from the teachers to determine if they were able to maintain their instruction skills five weeks after the children met their criteria. In these maintenance sessions, the teachers maintained their performances of presenting instruction skills with 100% accuracy levels.

Results Regarding Children with DD

Zeren's performance level of pointing to the thick one—which was her target behavior—was 0% both during the baseline probe sessions and pretest of generalization across settings and people sessions. Zeren could learn her target behavior at the end of nine training sessions, and 45 trials were conducted by her teacher. Zeren's performance level was 100% for the posttest of generalization across settings and people sessions. Zeren's teacher Nilay collected the posttest generalization across different materials data by embedding four trials into play activities and one trial into a painting activity. Zeren presented a 100% correct response performance level in these sessions. Her teacher collected maintenance data one, four, and eight weeks after Zeren acquired her behavior. Zeren's maintenance data regarding the three maintenance sessions of the target behavior were 100% correct responses.

Deniz performed with 0% accuracy during the two intermittent probe sessions and the baseline probe sessions for three consecutive sessions for his target behavior—pointing to the full object—and he responded with 0% correct responses to the generalization across settings and people pretest sessions. Deniz could learn her target behavior at the end of seven training sessions and 35 trials provided by her teacher. Deniz's performance level for the posttest session of generalization across settings and people sessions was 100%. Deniz's teacher Feraye collected the posttest generalization across materials data by using different materials by embedding two trials into sticking activities at the table and three trials into breakfast time. Deniz presented 100% correct responses. His teacher collected maintenance data one, four and eight weeks after he acquired his target behavior. Deniz responded with 100% accuracy in all three sessions regarding his target behavior.

Firat performed with 0% accuracy during the three intermittent probe sessions and the baseline probe sessions for three consecutive sessions for his target behavior—pointing to the blue object—and he responded with 0% correct responses to the generalization across settings and people pretest sessions. Firat learned his target behavior at the end of eight training sessions, and 40 trials were conducted by his teacher. The Firat's performance during the posttest generalization across settings and people sessions was 100%. Firat's teacher Zehra embedded one trial into a cutting activity at the table, one trial into a painting activity, and three trials into play activities using different materials for collecting posttest data of generalization across different materials. Firat presented 100% correct responses during these sessions. His teacher collected maintenance data one, four and eight weeks after Firat acquired his target behavior. Firat presented a 100% correct response rate in all three sessions regarding his target behavior.

Nehir performed with 0% accuracy during the four intermittent probe sessions and the baseline probe sessions for three consecutive sessions for her target behavior—pointing to the far object—and she responded with 0% correct responses to the generalization across settings and people pretest sessions. Nehir learned her target behavior at the end of 11 training sessions, and her teacher conducted 55 trials. Nehir's performance level in the posttest of generalization across settings and materials was 100%. Nehir's teacher Gökçe embedded all five trials into play activities by using different materials for collecting posttest data of generalization across materials. Nehir performed with 100% correct responses

in these sessions. Her teacher collected maintenance data one, four and eight weeks after Nehir acquired his target behavior. Nehir presented a 100% correct response in all three sessions regarding his target behavior.

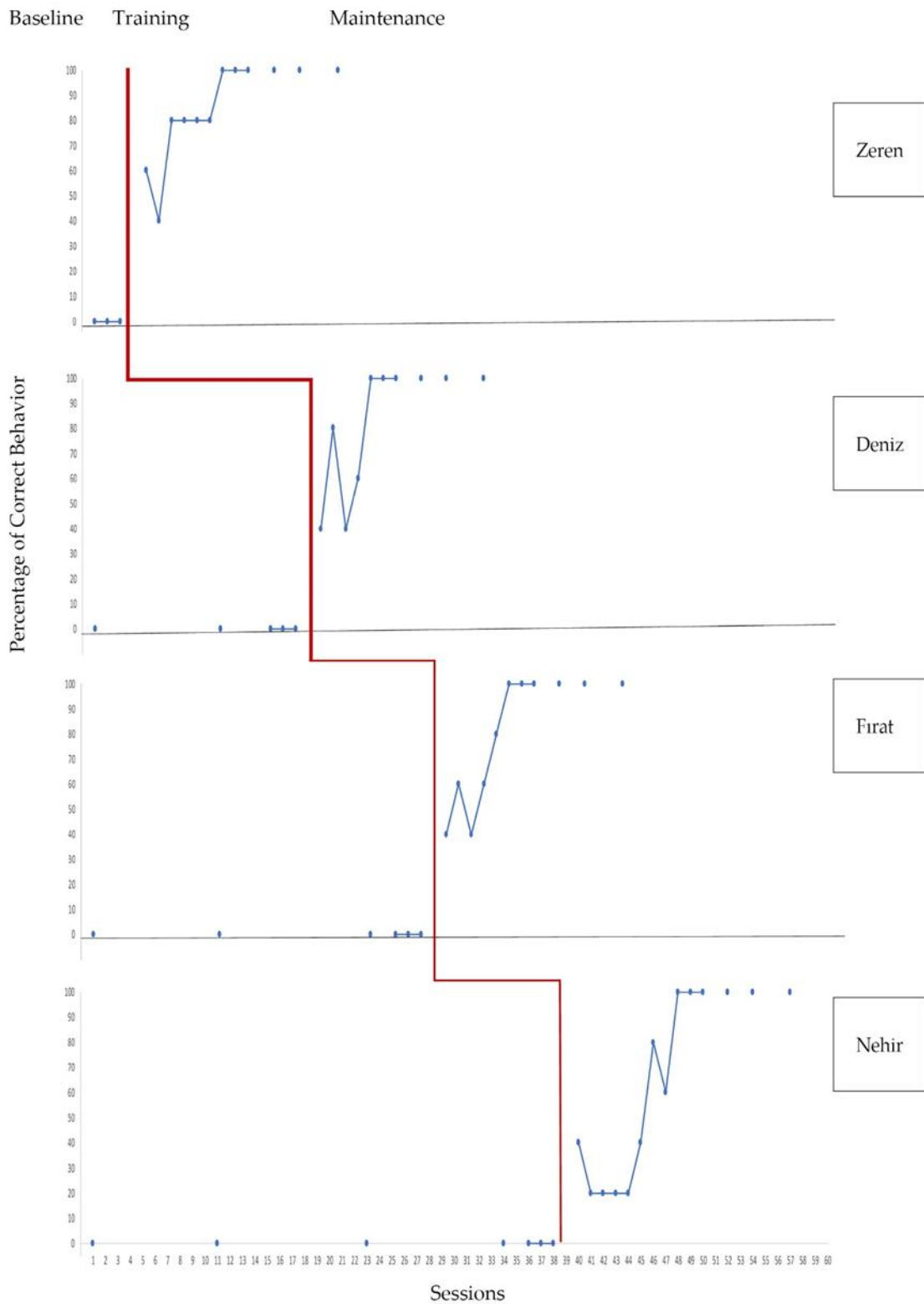


Figure 1. Percentage of correct responses for Zeren’s, Deniz’s, Firat’s, and Nehir’s target behaviors during the baseline, training, and maintenance sessions.

Result Regarding Social Validity

During the social comparison sessions, typically developing children presented an accuracy level of 100% regarding the behaviors to be taught to their peers with DDs before and after the study. The children with DDs presented 0% accuracy during the baseline sessions and 100% accuracy after the provided training regarding the target behaviors planned to be taught to them.

To collect the subjective evaluation data, the first author conducted semi structured interviews with both the preschool teachers and the parents of the children. In the study, the first author conducted semi structured interviews with the preschool teachers. The teachers mentioned that they liked the teacher training procedure provided to them, and they also liked the embedded instruction implementation procedure. The teachers reported that the parts they liked about the study were (a) the study's continuation, (b) using materials in the study that can easily be found in the school environment, (c) the implementation's ease, (d) the implementation procedure was clear and easy, (e) a child with a DD could benefit from the implementation without being apart from her/his peers, and (f) implementation could be realized without hindering the typically developing children's training. The teachers also mentioned that the problems that they faced were that (a) the classes were crowded, the schools were not physically sufficient, and they had difficulty collecting daily probe data due to a lack of support personnel in the classes and (b) they had difficulty continuing the typically developing peers' activities during the daily probe sessions.

Social validity data were collected from the parents of the children to determine the appropriateness of the target behaviors taught, method used, and results reached during the embedded instruction procedure provided to the children. The parents mentioned that they found the target behavior taught to their children important and also that the child was presenting the behavior in her/his daily life, they wanted to learn the teaching procedure used in the study, they were willing to participate in similar studies in which new behaviors would be taught to their children, and they were happy about their children were taught together with their peers.

Discussion and Conclusion

The researchers examined the following: (a) the control list prepared for the embedded instruction provided by simultaneous prompting procedure and writing plan, (b) the teachers' reliably presenting embedded instruction, maintenance and generalization data regarding these behaviors, (c) the effectiveness of the teaching provided by the participant teachers to the children with DDs in their classes, and (d) the social validity.

The researchers decided to determine a criterion for the teachers to pass to the implementing embedded instruction with the children phase. The determined criterion was responding with 100% correct responses to the control list regarding the embedded instruction provided by simultaneous prompting and preparing the embedded instruction plan with 100% accuracy. Therefore, the preschool teachers provided the instruction for their target behaviors after they met the criterion determined.

When the literature was examined regarding the studies in which teacher training was realized before implementation of embedded instruction by the teachers, it was found that there were only two studies in which the criterion was decided to be used before the teachers were allowed to continue to the implementation phase (Grisham-Brown et al., 2000; Malmskog & McDonnell, 1999). In both of these studies, it was reported that the teachers should meet the 90% criterion of correctly implementing the procedure before passing to the intervention phase. In the present study, similar to the other two studies, the teachers could pass to the implementation of the embedded instruction phase after they met the determined criterion.

In the present study, the preschool teachers could implement the embedded instruction provided by simultaneous prompting procedures with a high level of treatment fidelity. Snyder, Rakap, Hemmeter, McLaughlin, Sandall, and McLean (2015) mentioned the importance of researchers' providing information regarding how treatment fidelity was secured in the studies in which naturalistic

teaching was used. When the studies providing teacher training about embedded instruction in the literature were examined, out of 14 studies, treatment integrity data were collected in nine of them, and the treatment integrity seemed to be at a high level in those studies (Grisham-Brown et al., 2000; Grisham-Brown, Ridgley, Pretti-Frontczak, Litt, & Nielson, 2006; Grisham-Brown et al., 2009; Malmskog & McDonnell, 1999; McBride & Schwartz, 2003; Rakap, 2017b; Venn & Wolery, 1992; Wolery et al., 2002; Wolery, Anthony, & Heckathorn, 1998). From this point of view, one can say that the results regarding treatment fidelity of the present study were consistent with the other studies' results. In addition, it can also be said that the present study met the criterion of Snyder, Rakap, Hemmeter, McLaughlin, Sandall, and McLean (2015) about presenting information about the treatment integrity of the studies in which naturalistic teaching was used.

In the present study, the teachers were able to maintain their skills in implementing embedded instruction five weeks after the intervention sessions were completed. It was emphasized in the literature to collect data about the maintenance of their skills after the teachers were provided with teacher training regarding embedded instruction in the studies (Schepis et al., 2001; Wolery et al., 2002). In the four studies in which teacher training was provided regarding the implementation of embedded instruction (Kohler, Strain, Hoyson, & Jamieson, 1997; Rakap, 2017b; Tate et al., 2005; Venn & Wolery, 1992), the researchers evaluated the maintenance of the personnel's teaching skills. In those four studies, similar to the present study, the implementers were able to maintain their instruction skills after the criterion was met in the studies. The maintenance results of the present study show a supporting trend for the other studies' results.

In the present study, the teachers determined a different behavior from the one that they taught during intervention and prepared embedded instructions for that behavior correctly. In addition, the teachers were able to plan generalization across materials sessions by themselves and implement them with a high level of treatment integrity. Reviewing the research studies in which teacher training was provided regarding embedded instruction, it was observed that in three of these studies (McBride & Schwartz, 2003; Rakap, 2017b; Venn & Wolery, 1992), generalization data were collected from teachers. In these studies, the researchers planned for the teachers to generalize their acquired skills across different routines or to write instructional plans for different behaviors and implement them. In the present study, both the writing of embedded instruction plans by the teachers for a different behavior and implementing these plans with a high level of treatment integrity contribute to the literature by extending it.

The functional relation of the study among the acquisition of the target behaviors by the children and the instruction by the teachers was constructed by repeating the implementation with four teacher-child dyads. The effectiveness data regarding the implementation that the teachers realized were analyzed graphically. The graphical analysis demonstrates the effectiveness of the embedded instruction provided by the teachers on the children's learning of their target behaviors. The examined studies provide evidence that implementers who receive teacher training on embedded instruction can use embedded instruction effectively (Grisham-Brown et al., 2009; Horn et al., 2000; Macy & Bricker, 2007; Rakap, 2017b; Schepis et al., 2001; Toelken & Miltenberger, 2012; Wolery et al., 2002).

In the study, the children were able to maintain their target behaviors one, four, and eight weeks after the embedded instruction procedure was completed. In the literature review conducted by Snyder, Rakap, Hemmeter, McLaughlin, Sandall, and McLean (2015), it was determined that in almost half of the studies, the researchers did not make any plans regarding maintenance sessions. After this determination, Snyder, Rakap, Hemmeter, McLaughlin, Sandall, and McLean (2015) mentioned the importance of planning maintenance for future studies. When the studies in which embedded instruction was provided by teachers after receiving teacher training were reviewed, it was observed that in only six studies (Grisham-Brown et al., 2006; Grisham-Brown et al., 2009; Malmskog & McDonnell, 1999; Rakap, 2017b; Toelken & Miltenberger, 2012; Wolery et al., 2002) were maintenance sessions about the children's target behaviors planned; additionally, the children were able to maintain their target behaviors in those studies.

In the present study, the children with DDs were able to generalize their acquired target behaviors across different people, settings and materials. When the studies in which teacher training about embedded instruction were reviewed, only two studies (Horn et al., 2000; Wolery et al., 2002) included plans regarding the children's generalization of their target behaviors. In one of these studies, generalization across activities/settings (Horn et al., 2000) was planned, and in the other (Wolery et al., 2002), generalization across materials and people sessions were planned. In both of the studies, the children's performance levels regarding generalizing their target behaviors increased. The generalization results of these studies are consistent with the generalization results of the present study.

In this study, the researchers determined the social validity by social comparison and subjective evaluation. In studies conducted by using a naturalistic approach, it is suggested that researchers collect social validity data and share the results reached to show issues such as the applicability, acceptability and benefits of the procedures they conducted in their natural settings were embedded in activities and routines (Snyder, Rakap, Hemmeter, McLaughlin, Sandall, & McLean, 2015). In addition, in the literature review study conducted by Snyder, Rakap, Hemmeter, McLaughlin, Sandall, and McLean (2015), it was reported that out of 43 studies, only five studies considered social validity data. In the literature, when the studies were examined in which teacher training on embedded instruction was provided, in four of them (Horn et al., 2000; Malmkog & McDonnell, 1999; McBride & Schwartz, 2003; Rakap, 2017b), data were collected by using subjective evaluations. In all four studies, both the teachers' and parents' opinions regarding embedded instruction were positive. The subjective evaluation data of the present study were collected from both teachers and parents, similar to the literature. In this respect, the results reached via subjective evaluation show consistency with the other results in the literature and extend the literature. In addition to subjective evaluation, data were collected by social comparison in the present study. It can be said that the social validity results of the study enrich the literature.

In the present study, preschool teachers who had no experience or knowledge regarding embedded instruction and simultaneous prompting procedures received face-to-face teacher training on these issues. The preschool teachers could prepare instructional plans for their students and implement these plans with high levels of treatment integrity with the teacher training provided to them. From this point of view, the present study is one of a limited numbers of studies in the world literature and, to the best of the authors' knowledge, is the first study in Turkey. In the present study, similar to the studies in which teacher training was provided in the literature (Değirmenci, 2018; Rakap, 2017b; Toelken & Miltenberger, 2012; Tunç-Paftalı, 2018; Ünal, 2018), the children with DDs were able to acquire, generalize and maintain their target behaviors after they were provided with instruction by their teachers (Snyder, Rakap, Hemmeter, McLaughlin, Sandall, & McLean, 2015). At this point, it is thought that the teachers' presenting procedures placed under naturalistic instruction approaches successfully affected the performance levels of the children with DDs prohibitively, as observed in similar studies (Çelik, 2019; Grisham-Brown et al., 2009; Ünal, 2018). Thus, the quality of inclusion implementations in which children with DDs participate increases. Moreover, it is also thought that being in the same class as their peers and learning with the materials present in their classes could increase the motivation of children with DDs regarding learning their target behaviors. Thus, it is thought that planning studies regarding how children's outcomes are affected by increasing teacher qualifications might extend the related literature and make important contributions to the literature (Bakkaloğlu et al., 2018; Sucuoğlu et al., ; Ünal, 2018).

The study has some limitations that should be mentioned. These limitations can be listed as follows: (a) The study was limited to four preschools, four preschool teachers, four children with DDs who benefited from inclusion implementation in regular education settings, and four concepts taught to the children. (b) To use more time for instruction, the teachers presented the trials as distributed trials throughout the day, whereas they presented the trials as massed trials during daily probe sessions. (c) Since the first author implemented the teacher training and provided feedback throughout the whole process to the teachers, reliability data regarding the first researcher's presenting of the process as it was planned or not was not collected during the study. (d) Finally, since the first author presented the

teacher training and had an active role in the process, no evaluation was made regarding the first author's presenting of the training and communication skills.

Recommendations

Teacher trainings can be widespread regarding preschool teachers' use of embedded instruction. Courses in which embedded instruction and other evidence-based implementations are being taught theoretically and by implementations might be included in the undergraduate programs of related majors.

Researchers might teach different evidence-based implementations to preschool teachers and examine the effects of these implementations when provided by the teachers on the acquisition of behaviors by children. Researchers might also plan studies in which they provide teacher training regarding teachers providing social or chained skills teaching by embedded instruction to children with DDs and examine the effectiveness of this intervention on the children's acquisition levels of their target behaviors. Researchers might conduct studies in which they examine the results of parents or siblings planning and providing instruction to children regarding various target behaviors embedded in routines and activities in the naturalistic setting.

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