

The Effectiveness of an Early Intervention Program Developed based on Naturalistic Teaching Processes (DÖDEM) for Children with Down Syndrome and Their Families in Turkey*

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Abstract

Introduction: The main focus of early intervention is to strengthen the interaction of parents with young children with disabilities, and to ensure that parents become active participants in the development and education of their children. The purpose of this study is to examine the effectiveness of an Early Intervention Program based on Naturalistic Teaching (DÖDEM), which has been developed in order to strengthen the interaction of parents with their children with Down syndrome and to introduce naturalistic teaching strategies to them.

Methods: The DÖDEM program was provided face-to-face through group family training sessions and home visits for a group of participants, while it was followed remotely by another group of participants via a tablet computer. The study was conducted with 10 parents and their children with Down syndrome aged 25-48 months. A mixed method research design was used in this study.

Results: The findings demonstrate that the parents in both groups made significant progress in interactional behaviours and increased the usage frequency of naturalistic teaching strategies. Furthermore, parents think that the program contributes positively to their interactions with their children and support the development of their children.

Conclusion: The results obtained demonstrated that following the DÖDEM program in both ways contributed to significant improvement in the parents' interactional behaviours and the frequency of use of naturalistic teaching strategies. Thus, it can be said that this process has led to a change in both the parents' and children's behaviours.

Keywords: Parent-Child Interaction, Naturalistic Teaching, Parent-Implemented Interventions, Face-To-Face Parent Education, Offline Distance Education.

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INTRODUCTION

“Parents have the unique ability to foster their child’s development from the very beginning of life.”

(Leigh, Nievar and Nathans, 2011, p. 281)

It is of great importance to carry out an effective early intervention process on the basis of evidence-based practices. Therefore, it is emphasized that early intervention practices should include family-centered practices that aim family participation and education and take the natural setting of both the family and the child into account (Meadan *et al.* 2013; Meadan and Daczewitz 2015; Odom and Wolery 2003). Based on this, it is observed that studies on the development of parent-implemented intervention programs gain more importance with each passing day. It draws attention that important studies have been carried out, especially on parental responsiveness and sensitivity. It is noteworthy that parent-implemented naturalistic teaching intervention programs have been recently developed for the teaching of strategies based on the naturalistic teaching approach, which is among evidence-based practices, to parents (Brown and Woods 2015; Kaiser *et al.* 1996; Kaiser and Roberts 2013; Kashinath *et al.* 2006; McDuffie *et al.* 2013; Meadan *et al.* 2014a; Meadan *et al.* 2016; Mobayed *et al.* 2000; Moore *et al.* 2014; Peterson *et al.* 2005). Naturalistic teaching approaches are defined as the process of providing education to the child by parents or teachers during the routines, activities, and transitions in the daily life of the child to develop the existing skills of children and to ensure that they acquire new skills (Halle *et al.* 1984; Peterson 2009; Roberts and Kaiser 2011; Meadan *et al.* 2016; Warren and Kaiser 1986; Wolery 1994).

The studies conducted within the scope of the naturalistic teaching approach show that this approach can be applied effectively in different settings, at different times, and with different people (Grisham-Brown *et al.* 2000; Harjusola-Webb and Robbins 2011; Kaiser *et al.* 2000; Kaiser and Roberts 2013; Kohler *et al.* 1997; Kohler *et al.* 2001; Meadan *et al.* 2014b; Nunes and Hanline 2007; Pretti-Frontczak and Bricker 2001; Toelken and Miltenberger 2012). The studies demonstrate that families of children with developmental disabilities may acquire implementation knowledge and skills with regard to the strategies and techniques used in the naturalistic teaching process (Kaiser *et al.* 1998; Kaiser *et al.* 2000; Meadan *et al.* 2014b; Meadan *et al.* 2013; Moore *et al.* 2014; Nunes and Hanline 2007), families can apply the strategies and techniques they have learned in their natural settings with high implementation reliability (Kaiser and Roberts 2013; McDuffie *et al.* 2013; Moore *et al.* 2014; Yoder and Warren 2002), families are satisfied with the education they have received and children make progress especially in the language development (Meadan *et al.* 2014a; Mobayed *et al.* 2000; Peterson *et al.* 2005; Yoder and Warren 2002). Furthermore, it is observed that families can turn the routines, activities, and transitions occurring during the day into a meaningful learning setting for their children by making some adaptations in their daily lives (Kaiser and Roberts 2013; McDuffie *et al.* 2013).

It is also observed that various early intervention programs have been developed and implemented nowadays to develop and strengthen parental responsiveness and to provide parents with the skills using which they can support their children’s development in opportunities that occur in daily life. Especially, it is observed that early intervention programs based on online or offline education have gained great importance nowadays as a solution to limitations, such as access to education, time, and resources, along with the developing technology (Curtiss *et al.* 2016). It is noteworthy that online or internet-based distance education programs are transferred to families with different applications. As an example of these applications, telepractice (Baharav and Reiser 2016; Meadan *et al.* 2016), online modules (Hamad *et al.* 2010; Kobak *et al.* 2011; Wainer and Ingersoll 2012), e-Learning programs (Jang *et al.* 2012), and videoconference (Meadan *et al.* 2013) can be given. Moreover, it is suggested that new early intervention models should be investigated for parents having limited access to early intervention services. Therefore, it draws attention that studies involving the development of parent-implemented early intervention programs that are based on offline, online

or internet-based distance education and include coaching practices, and testing their effectiveness have been carried out (Baharav and Reiser 2016; Hamad *et al.* 2010; Jang *et al.* 2012; Kobak *et al.* 2011; McDuffie *et al.* 2016; Meadan *et al.* 2016; Stoner *et al.* 2012; Wainer and Ingersoll 2012). In addition, there are studies comparing the effectiveness of face-to-face practices and online family education programs (DuPaul *et al.* 2017; Spence *et al.* 2006). Furthermore, it is observed that parent-implemented education programs based on online distance education have been developed to teach naturalistic teaching strategies to parents and support the use of these strategies by parents during daily routines occurring in their natural settings (Meadan *et al.* 2013; Meadan *et al.* 2016; Stoner *et al.* 2012).

In light of all this information, in this study, it was aimed to develop and test the effectiveness of the developed program named the Early Intervention Program Based on Naturalistic Teaching (Dogal Ogretim Dayalı Erken Mudahale-DÖDEM Program) to increase the quality of interaction between parents and their children with Down syndrome aged 24-48 months and to ensure that they acquire the implementation skills of the strategies and techniques used in the naturalistic teaching process. Answers to the following research questions were sought:

1. Regarding the pre-test, post-test, and follow-up total of the parents in the Experimental group-I and Experimental group-II:
 - a. Is there a significant difference in the interactional behaviour scores (in-group and between-groups)?
 - b. Is there a significant difference between the scores of using naturalistic teaching strategies (in-group and between-groups)?
2. What are the opinions of the parents on the effect of the DÖDEM program on their interaction with their children?
3. What are the opinions of the parents on the contribution of the DÖDEM program to their children's development?

METHODS

Research Design

In the study, a convergent basic design, which is based on the interpretation of quantitative and qualitative findings by combining or comparing, was used, and the study was conducted with the static-group pretest-posttest experimental design, which is a mixed method experimental design (Creswell and Plano Clark 2018).

Participants

After gathering approval of Ethical Review Board of Anadolu University and parental consent, the study was carried out with 10 children with Down syndrome aged between 24-48 months and their parents (9 mothers, 1 father). The ages of the parents in the study group vary between 23-46 years ($M: 38.20$, $SD: 6.63$). Nine of the parents who participated in the study are mothers, and one is the father. The children's ages vary between 25-48 months ($M: 33.90$, $SD: 6.935$). Four of the children are boys, and six are girls. The children's developmental assessments were performed with the Gazi Early Childhood Assessment Tool (GECAT), a tool developed in Turkey (Temel, Ersoy, Avcı and Turla 2004). It is observed that children experience delays in all developmental areas (psycho-motor development, cognitive development, language development, social-emotional development) according to their age.

Independent Variable

The independent variable of this study is the Early Intervention Program Based on Naturalistic Teaching (DÖDEM). The DÖDEM program is a family-centered or parent-implemented early intervention program developed for parents of children with Down syndrome. The main purpose of this program is to strengthen the interaction of parents with their children, to teach parents the strategies and techniques that help turn opportunities that occur naturally in their natural settings into a meaningful learning opportunity and support children's development.

The program was developed as a package-program consisting of a total of eight group family training sessions, a total of two home visit sessions at the end of the first four sessions and at the end of the final session, including written and visual materials for both experts and parents. All written and visual materials developed within the scope of the program were converted into a tablet computer application. Thus, it was aimed to follow the program remotely both face-to-face and via a tablet computer offline. As a result of the literature review, written and visual materials were created, each covering a different subject and organized separately for each session. In this context, expert and parent booklets, PowerPoint presentations for group family training sessions, expert and practice booklets for home visit sessions, expert and parent assessment forms, and sample practice videos were prepared.

In the process of the DÖDEM program development, a total of 166 videos were prepared to support subjects on which information was provided, qualified parental behaviours, and naturalistic teaching strategies. Attention was paid to make a sample practice videos related to each parenting behaviour, strategy, and technique addressed within the scope of the DÖDEM program. Videos reflected the natural setting, natural interactions as much as possible. In this context, videos were shot at a different time and in a different setting with each child and parent (dinner, hand washing, playing in the park, returning from school to home, etc.).

A total of eight parent booklets in the tablet computer application contain exactly the same information transferred during face-to-face group family training sessions and sample practice videos. Thus, it was aimed to ensure that parents could access these parent booklets offline via a tablet computer. Parent booklets were designed to allow parents to read them easily and instantly watch the practice videos supporting the subject explained by clicking on them. answering the questions.

Dependent Variables and Measures

Different data collection tools, qualitative and quantitative, were used to collect data in the study. In order to compare the consistency of the qualitative and quantitative findings obtained in the study, support quantitative findings with qualitative findings and strengthen them, and to ensure data diversity, care was taken to collect qualitative data during the study. For this purpose, video recordings, field notes, parent logs, and semi-structured interviews were used in the study. The quantitative data collection tools used in the study are as follows.

Parent-Child Interactions

The Maternal Behaviour Rating Scale (MBRS, Mahoney, Powell and Finger 1986) was used to evaluate parental behaviours during the parent-child interaction. The Turkish adaptation studies of the scales were performed by Diken, Topbas and Diken (2009) on a total of 123 mother-child dyads with different developmental disabilities.

Frequency of Using Strategies of Parents and Verbal Imitation of Children

In the pre-test, post-test, and follow-up processes, in the parent-child interaction during a 15-min play activity on average and during the snack meal routine, a coding form was developed to determine (1) the frequency of parents' use of naturalistic teaching strategies, (2) the frequency of verbal imitation of children. The developed coding form was sent to 10 experts working in the field of special education, and opinion regarding the coding form was received from each expert. The developed coding form was evaluated by the researcher and two experts, independent of each other. In this context, three videos were watched with each expert, a code was assigned, and the use of the coding form was reviewed. Therefore, the coding form was made ready for use as a form in which a total of 10 strategies are evaluated, operational definitions are made, and certain code assignment criteria are determined.

Implementation

The implementation process of this study consists of five stages: pilot study, pre-test data collection, implementation of the program, post-test data collection, and follow-up stages.

Pilot Study

The pilot study consisted of a total of three stages. In the first stage of the pilot study, 20-min play activity and snack meal routine videos were taken with a 48-month-old child with Down syndrome and his mother in their own house using the prepared toy set (a house play set, book, blocks, etc. suitable for the developmental level of the child) and a set of snack meal routine materials (snack crackers, fruit, water, plastic fork, knife, plate, etc.). In the second stage of the pilot study, four (2nd, 5th, 7th, and 8th sessions) of the eight group family training sessions prepared within the scope of the DÖDEM program were applied for two weeks as two sessions per week with a total of six parents. In the third stage of the pilot study, the second home visit session, which was predicted to be held in the last four sessions of the DÖDEM program, was held in the house of the parent-child dyad worked with in the first stage. Thus, the implementation process, data collection tools, and materials were tested, and the necessary changes were made.

Pre-Test Data Collection

In the pre-test data collection process, an appointment was made with each parent on the day and at the time convenient for them, and each parent-child dyad was visited in their own house. Thus, before the implementation, each parent-child dyad was video-recorded during an average of 15-min play activity and snack meal routine.

Implementation of the Program

After the collection of the implementation data, face-to-face group family training sessions started to be implemented with a group of parents (Experimental group-I), while the other group of parents (Experimental group-II) started to follow the DÖDEM program remotely via a tablet computer offline. This process was conducted in parallel. Therefore, the implementation of the program lasted for a total of 10 weeks. Group family training sessions were held by the first researcher, as sessions conducted one day a week and lasting for about one and a half hours. After the first four of the group family training sessions and the last eighth session were completed, two home visit sessions were held with the parents in the Experimental group-I. It was aimed to become a model to parents with regard to quality parenting behaviours emphasized in the first home visit session and the first four sessions, strategies used in the naturalistic teaching process emphasized in the second home visit session and the last four sessions, provide feedback and guide them.

Post-Test and Follow-Up Data Collection

The post-test data collection carried out as soon as the implementation ended. The follow-up data of the study were also collected exactly one month after the post-test data collection. In the post-test and follow-up data collection process, all stages during the pre-test data collection were repeated in the same way, the same toy set, food, equipment, and room were used. In this context, each parent-child dyad was video-recorded for an average of 15 min, including a play activity and snack meal routine. In addition to these, semi-structured interviews were conducted with all parents on the day and at the time appropriate for them after the implementation.

Data analysis

Validity

In order to ensure credibility (internal validity) at the qualitative dimension of this study, continuous observation, triangulation, expert review, negative case analysis, participant confirmation were used, while purposeful sampling processes with rich, intense, and detailed description were used to ensure transferability (external validity).

Reliability

Coding of Parent-Child Interactions and Interobserver Reliability. In the study, all of the 15-min play activity video recordings (a total of 30 video recordings) obtained with each parent-child dyad in the pre-test, post-test, and maintenance stages were coded using the MBRS. Of these video recordings selected in an unbiased way, 30% (a total of 9 video recordings, three pre-test videos, three post-test videos, and three maintenance videos) were coded by an independent observer doing a doctorate in the field of special education. After analyzing the 15-min video recordings of each parent-child dyad by the encoders with whole interval recording, inter-observer reliability data were calculated on the item basis. It can be said that the intercoder reliability was quite high for the MBRS (94.5%).

Coding of Parents' Use of Natural Teaching Strategies and Children's Frequency of Verbal Imitation Outputs and Interobserver Reliability. In the study, all of the 15-min play activity and snack meal routine video recordings (a total of 60 video recordings) obtained with each parent-child dyad in the pre-test, post-test, and maintenance stages were coded using the coding form. The first encoder (the first author) coded all of the video recordings using the NOLDUS-The Observer XT program. Afterward, 30% of the videos selected in an unbiased manner (a total of 18 videos, including nine play activity videos and nine snack meal routine videos) were coded by an independent observer doing a doctorate in the field of special education using the same program.

The NOLDUS-The Observer XT program conducts Kappa analysis, which is a statistical method that measures the reliability of agreement between two or more observers. In this study, the lowest Kappa value between the researcher and second encoder was found to be 0.78, the highest Kappa value was found to be 0.97, and the average Kappa value was found to be 0.88. Therefore, it can be said that there was a perfect agreement between the two encoders.

RESULTS

Results Related to the Effect of the DÖDEM Program on the Interactional Behaviours of Parents

It was attempted to determine the effect of following the DÖDEM program with group family training sessions and home visit sessions and following the DÖDEM program on the tablet computer on the parents' interactional behaviours. In this regard, firstly, the total score averages of the

interactional behaviours of the parents in the Experimental group-I and the Experimental group-II were compared within the group, and it was tried to determine the parents' progress within themselves. To this end, the Friedman test was used. To calculate the effect size, Kendall's coefficient of concordance was used. The obtained Kendall's W scores were interpreted according to the interpretation guidelines of Cohen (1988) as 0.1 (small effect), 0.3 (medium effect), and ≥ 0.5 (strong effect). The results obtained as a result of the Friedman test are presented in Table 1.

In accordance with these results, it can be said that following the DÖDEM program with group family training sessions and home visit sessions had a strong effect on the parents' interactional behaviours, and this effect continued four weeks after the implementation. Likewise, it can also be said that following the DÖDEM program on a tablet computer had a strong effect on the parents' interactional behaviours, and this effect continued four weeks after the implementation. However, in order to determine the source of the difference and to make a more detailed investigation, the Wilcoxon signed-rank test was used. As a result of the Wilcoxon signed-rank test, a tighter alpha level was determined with the Bonferroni correction performed to avoid Type I error.

According to the result of the Wilcoxon signed-rank test, it is observed that the difference between the post-test and pre-test ($z=-2.032$, $p>.017$), maintenance and pre-test ($z=-2.041$, $p>.017$), maintenance and post-test total score averages ($z=-1.000$, $p>.017$) of the "Sensitivity-Responsivity" sub-scale of the parents in both the Experimental group-I and Experimental group-II was not significant. The difference between the post-test and pre-test ($z=-2.032$, $p>.017$), maintenance and pre-test ($z=-2.032$, $p>.017$), maintenance and post-test total score averages ($z=-1,000$, $p>.017$) of the "Affect-Expressiveness" sub-scale was observed to be insignificant. Likewise, it is observed that the difference between the post-test and pre-test ($z=-2.060$, $p>.017$), maintenance and pre-test ($z=-2.041$, $p>.017$), maintenance and post-test total score averages ($z=-2.060$, $p>.017$) of the "Achievement Orientation-Directiveness" sub-scale was not significant.

This situation is thought to be caused by the Bonferroni correction. As a matter of fact, a value of .017 is determined as the significance value when the Bonferroni correction is performed to avoid Type I error. However, as is also stated by Huck (2012), when very strict measures are taken to avoid Type I error, the possibility of the occurrence of Type II error increases, and a result that may be statistically significant may be overlooked. Furthermore, an important limitation of this study is that it was conducted with a small number of participants. Therefore, it is thought that this situation may have caused the achievement of these results. Thus, it is of great importance to follow a path that considers both errors in order to avoid both errors in scientific research. In this context, firstly, the results of the inter-group comparison were included in the following stage, and then, the intra-group comparisons were made over the total number of participants.

Table 1. The Friedman test results of the pre-test, post-test, and maintenance total score averages with regard to the interactional behaviours of the parents in the experimental group-i and experimental group-ii

	n	X	SS	Mean rank	χ^2	sd	p	Kendal l's W	
Experimental group-I	Sensitivity-Responsivity								
	Pre-test	5	8.40	0.548	1.00	9.500	2	.009*	.95
	Post-test	5	19.00	1.414	2.40				
	Maintenance	5	19.40	1.342	2.60				
	Affect-Expressiveness								
	Pre-test	5	11.20	1.643	1.00	9.500	2	.009*	.95
	Post-test	5	24.60	0.548	2.60				
	Maintenance	5	24.40	0.894	2.40				
	Achievement Orientation-Directiveness								
Pre-test	5	13.20	1.643	3.00	9.500	2	.009*	.95	

Experimental group-II	Post-test	5	9.40	0.894	1.40				
	Maintenance	5	9.80	1.095	1.60				
	Sensitivity-Responsivity								
	Pre-test	5	8.60	1.342	1.00	9.294	2	.010*	.93
	Post-test	5	18.20	1.095	2.55				
	Maintenance	5	17.80	1.483	2.45				
	Affect-Expressiveness								
	Pre-test	5	12.80	2.490	1.00	8.824	2	.012*	.88
	Post-test	5	22.80	1.095	2.50				
	Maintenance	5	23.00	1.414	2.50				
	Achievement Orientation-Directiveness								
	Pre-test	5	14.40	1.342	3.00	10.000	2	.007*	.1
Post-test	5	10.60	0.894	1.50					
Maintenance	5	10.60	0.894	1.50					

p<.05

The Mann-Whitney U test was used to compare the total score averages of the interactional behaviours of the parents in the Experimental group-I and Experimental group-II between the groups. The Bonferroni correction was performed, and the effect size was calculated using the formula of ($r=z/\sqrt{n}$). The obtained r value was interpreted by taking into account the interpretation guidelines of Cohen (1988) as 0.1 (small effect), 0.3 (medium effect), and ≥ 0.5 (strong effect). The Mann-Whitney U test results are presented in Table 2. In this context, it can be said that following the DÖDEM program both with group family training sessions and home visit sessions and on a tablet computer had a strong effect on the parents' interactional behaviours, and this effect continued after the implementation.

Based on the absence of an inter-group difference, the participants in both groups were addressed as a single group, and the Friedman test was applied to compare the pre-test, post-test, and maintenance total score averages of the parents' interactional behaviours over the total number of participants (n=10). As a result of the Friedman test, the pre-test, post-test, and maintenance total score averages of the "Sensitivity-Responsivity" ($\chi^2= 18.242$, $p<.05$, Kendall's $W=.91$), "Affect-Expressiveness" ($\chi^2= 18.242$, $p<.05$, Kendall's $W=.91$) and "Achievement Orientation-Directiveness" ($\chi^2= 19.419$, $p<.05$, Kendall's $W=.97$) sub-scales of all the parent participants in both groups were compared, and the difference between them was observed to be significant. In order to determine the source of the difference and to make a more detailed investigation, the Wilcoxon signed-rank test was used, and the Bonferroni correction was performed.

According to the result of the Wilcoxon signed-rank test, a significant difference was found in favor of the post-test between the parents' post-test and pre-test total score averages of the "Sensitivity-Responsivity" ($z=-2.820$, $p<.017$, $r=.89$), "Affect-Expressiveness" ($z=-2.814$, $p<.017$, $r=.89$), and "Achievement Orientation-Directiveness" ($z=-2.831$, $p<.017$, $r=.90$) sub-scales. A significant difference was determined in favor of maintenance between the parents' maintenance and pre-test total score averages of the "Sensitivity-Responsivity" ($z=-2.816$, $p<.017$, $r=.89$), "Affect-Expressiveness" ($z=-2.810$, $p<.017$, $r=.89$), and "Achievement Orientation-Directiveness" ($z=-2.827$, $p<.017$, $r=.90$) sub-scales. On the other hand, there was no significant difference between the parents' maintenance and post-test total score averages of the "Sensitivity-Responsivity" ($z=.000$, $p>.017$, $r=.32$), "Affect-Expressiveness" ($z=.000$, $p>.017$, $r=.32$), and "Achievement Orientation-Directiveness" ($z=-1.000$, $p>.017$, $r=.32$) sub-scales. In line with these results obtained, it can be said that the DÖDEM program followed by a group of parents with group family training sessions and home visit sessions and followed by the other group of parents on a tablet computer had a strong effect on the parents' interactional behaviours, and this effect continued four weeks after the implementation.

Table 2. The Mann-Whitney U test results with regard to the comparison of the interactional behaviours of the parents in the experimental group-i and experimental group-ii

		n	Mean Rank	Sum of Ranks	U	p	r
Sensitivity-Responsivity	<i>Pre-test</i>						
	Experimental group-I	5	5.40	27.00	-.112	.911	.05
	Experimental group-II	5	5.60	28.00			
	<i>Post-test</i>						
	Experimental group-I	5	6.30	31.50	-.894	.371	.40
	Experimental group-II	5	4.70	23.50			
<i>Maintenance</i>							
Experimental group-I	5	7.30	36.50	-1.571	.116	.70	
Experimental group-II	5	3.70	18.50				
Affect-Expressiveness	<i>Pre-test</i>						
	Experimental group-I	5	4.40	22.00	-1.174	.240	.52
	Experimental group-II	5	6.60	33.00			
	<i>Post-test</i>						
	Experimental group-I	5	7.60	38.00	-2.324	.020	.1
	Experimental group-II	5	3.40	17.00			
<i>Maintenance</i>							
Experimental group-I	5	7.10	35.50	-1.747	.081	.78	
Experimental group-II	5	3.90	19.50				
Achievement Orientation-Directiveness	<i>Pre-test</i>						
	Experimental group-I	5	4.50	22.50	-1.225	.221	.55
	Experimental group-II	5	6.50	32.50			
	<i>Post-test</i>						
	Experimental group-I	5	4.00	20.00	-1.800	.072	.80
	Experimental group-II	5	7.00	35.00			
<i>Maintenance</i>							
Experimental group-I	5	4.50	22.50	-1.225	.221	.55	
Experimental group-II	5	6.50	32.50				

Critical $p = .05/3 = .017$ (Bonferroni) $p > .017$

Results Regarding the Parents' Use of the Naturalistic Teaching Strategies They Learned Within the Scope of the DÖDEM Program

The Friedman test was used to compare the total score averages with regard to the use of naturalistic teaching strategies by the parents in the Experimental group-I and Experimental group-II. Upon examining the results obtained with the Friedman test in Table 3, it can be said that following the DÖDEM program with group family training sessions and home visit sessions had a strong effect on the frequency of the parents' use of naturalistic teaching strategies, and this effect continued four weeks after the implementation. Likewise, it can be said that following the DÖDEM program on a tablet computer had a strong effect on the frequency of the parents' use of naturalistic teaching strategies, and this effect also continued four weeks after the implementation. In order to determine the source of the difference and make a more detailed investigation, the Wilcoxon signed-rank test was used. When multiple comparisons were made on the same group in the same dataset, the Bonferroni correction was performed to reduce the possibility of finding a meaningful result by chance. According to the result of the Wilcoxon signed-rank test, it is observed that the difference between the post-test and pre-test ($z = -2.023$, $p > .017$), maintenance and pre-test ($z = -2.023$, $p > .017$), maintenance and post-test total score averages ($z = -1.483$, $p > .017$) with regard to the frequency of use of naturalistic teaching strategies by the parents in the Experimental group-I during the "Play Activity" was not significant.

Table 3. The Friedman test results with regard to the pre-test, post-test, and maintenance total score averages of the frequency of use of naturalistic teaching strategies by the parents in the experimental group-i and experimental group-ii

		n	X	SS	Mean Rank	χ^2	sd	p	Kendal l's W
Experimental group-I	Play Activity								
	Pre-test	5	66.00	14.05	1.00	8.400	2	.015*	.84
	Post-test	5	230.00	29.08	2.80				
	Maintenance	5	217.00	28.91	2.20				
	Snack Meal Routine								
	Pre-test	5	52.00	10.20	1.00	7.600	2	.022*	.76
Experimental group-II	Post-test	5	185.00	25.42	2.60				
	Maintenance	5	185.60	30.44	2.40				
	Play Activity								
	Pre-test	5	73.00	14.78	1.00	8.400	2	.015*	.84
	Post-test	5	202.80	23.63	2.20				
	Maintenance	5	231.00	17.56	2.80				
Experimental group-II	Snack Meal Routine								
	Pre-test	5	55.00	10.54	1.00	8.400	2	.015*	.84
	Post-test	5	174.40	20.38	2.20				
	Maintenance	5	177.00	31.88	2.80				

p<.05

The difference between the post-test and pre-test ($z=-2.023$, $p>.017$), maintenance and pre-test ($z=-2.032$, $p>.017$), maintenance and post-test total score averages ($z=-0.135$, $p>.017$) with regard to the frequency of use of naturalistic teaching strategies during the “Snack Meal Routine” was not found to be significant. According to the result of the Wilcoxon signed-rank test, the difference between the post-test and pre-test ($z=-2.023$, $p>.017$), maintenance and pre-test ($z=-2.023$, $p>.017$), maintenance and post-test total score averages ($z=-1.483$, $p>.017$) with regard to the frequency of use of naturalistic teaching strategies by the parents in the Experimental group-II during the “Play Activity” is observed to be insignificant. It is determined that the difference between the post-test and pre-test ($z=-2.023$, $p>.017$), maintenance and pre-test ($z=-2.023$, $p>.017$), maintenance and post-test total score averages ($z=-0.674$, $p>.017$) with regard to the frequency of use of naturalistic teaching strategies during the “Snack Meal Routine” was not significant. It is thought that this situation is caused by the Bonferroni correction performed.

Based on this result, the Mann-Whitney U test was used to compare the total score averages with regard to the frequency of use of naturalistic teaching strategies by the parents in the Experimental group-I and Experimental group-II between the groups. When the results obtained with the Mann-Whitney U test in Table 4 are examined, it can be said that following the DÖDEM program both with group family training sessions and home visit sessions and via a tablet computer had a strong and permanent effect on the frequency of using naturalistic teaching strategies by the parents during the play activity. Likewise, it can be said that following the DÖDEM program both with group family training sessions and home visit sessions and via a tablet computer had a moderate effect on the frequency of using naturalistic teaching strategies by the parents during the snack meal routine, and this effect was permanent.

The Friedman test was used to compare the pre-test, post-test, and maintenance total score averages with regard to the frequency of use of naturalistic teaching strategies by the parents following the DÖDEM program over the score averages of all the parent participants in both groups. When the results of the Friedman test were examined, the pre-test, post-test, and maintenance total score averages with regard to the frequency of use of naturalistic teaching strategies by the parents during

the “Play Activity” ($\chi^2= 15.000$, $p<.05$, Kendall’s $W=.75$) and “Snack Meal Routine” ($\chi^2= 15.200$, $p<.05$, Kendall’s $W=.76$) were compared, and the difference between them was found to be significant. The Wilcoxon signed-rank test was used to determine the source of the difference and make a more detailed investigation. The Bonferroni correction was performed, and the effect size was calculated using the formula of ($r=z/\sqrt{n}$). The obtained r value was interpreted by taking into account the interpretation guidelines of Cohen (1988) as 0.1 (small effect), 0.3 (medium effect), and ≥ 0.5 (strong effect).

Table 4. The Mann-Whitney U Test Results of the Comparison of the Total Score Averages with regard to the Frequency of Use of Naturalistic Teaching Strategies by the Parents in the Experimental group-I and Experimental group-II

		n	Mean Rank	Sum of Ranks	U	p	r
Play Activity	<i>Pre-test</i>						
	Experimental group-I	5	4.90	24.50	-.629	.530	.28
	Experimental group-II	5	6.10	30.50			
	<i>Post-test</i>						
	Experimental group-I	5	6.80	34.00	-1.358	.175	.61
	Experimental group-II	5	4.20	21.00			
	<i>Follow-up</i>						
	Experimental group-I	5	4.20	21.00	-1.362	.173	.61
	Experimental group-II	5	6.80	34.00			
Snack Meal Routine		n	Mean Rank	Sum of Ranks	U	p	r
	<i>Pre-test</i>						
	Experimental group-I	5	5.00	25.00	-.522	.602	.23
	Experimental group-II	5	6.00	30.00			
	<i>Post-test</i>						
	Experimental group-I	5	6.20	31.00	-.731	.465	.33
	Experimental group-II	5	4.80	24.00			
	<i>Follow-up</i>						
	Experimental group-I	5	6.40	32.00	-.946	.344	.42
Experimental group-II	5	4.60	23.00				

Critical $p= .05/3=.017$ (Bonferroni) $p<.017$

According to the result of the Wilcoxon signed-rank test, a significant difference was found in favor of the post-test between the post-test and pre-test total score averages with regard to the frequency of use of naturalistic teaching strategies by all the parent participants in both groups during the “Play Activity” ($z=-2.803$, $p<.017$, $r=.89$) and “Snack Meal Routine” ($z=-2.807$, $p<.017$, $r=.89$). A significant difference was found in favor of maintenance between the maintenance and pre-test total score averages with regard to the frequency of use of naturalistic teaching strategies by the parents during the “Play Activity” ($z=-2.805$, $p<.017$, $r=.89$) and “Snack Meal Routine” ($z=-2.805$, $p<.017$, $r=.89$). On the other hand, no significant difference was found between the maintenance and post-test total score averages with regard to the frequency of use of naturalistic teaching strategies by the parents during the “Play Activity” ($z=-.459$, $p>.017$, $r=.15$) and “Snack Meal Routine” ($z=-.459$, $p>.017$, $r=.15$). In line with these results obtained, it can be said that the DÖDEM program had a strong effect on the parents’ use of naturalistic teaching strategies, and this effect continued four weeks after the implementation.

The opinions of the parents on the effect of the DÖDEM program on their interaction with their children and their children’s development.

In the interviews conducted with the both groups of parents, it was observed that the parents expressed the effect of the DÖDEM program on the interaction with their children by associating it with the contributions it provided to them. The parents stated that the program contributed to the

processes of “following the child’s leadership,” “being a good playmate,” “enjoying playing games,” “presenting a linguistic input suitable for the child’s developmental level,” “supporting the child’s development in daily life,” “changing a perspective on the child,” and “psychological relaxation.” The parents stated that their interaction with their children changed positively, especially after the implementation. For example, one of the parents expressed his/her opinions in the following way:

“Our interaction has become very different. I have learned to enter the world of my child without creating pressure on him completely. For example, I used to push him before...Now I’m following his leadership, waiting... He has his own preferences after all...” (Tab-E2).

Vocal imitation or verbal imitation is defined as the imitation of communicative or non-communicative pronunciation produced by someone else (Yoder et al., 1994; Yoder and Warren, 2002). In this study, verbal imitation was addressed as the child’s full imitation or imitation with minor changes of the adult’s pronunciation. The fact that the child imitated the voice or the beginning or the end of the word against the adult’s vocal or verbal outputs was considered to be imitation with minor changes. During the observations made within the scope of this study, it was observed that the children imitated the pronunciation of their parents with or without purpose.

During the interviews, it was observed that the parents mentioned the contributions of the program to the language development of their children and expressed their opinions that the program had an effect on increasing their children’s verbal imitation outputs. It was noteworthy that the parents indicated an increase in the verbal imitation outputs of their children as a result of paying attention especially to the children’s development and presenting a linguistic input suitable for the developmental level of the child. When the opinions of the parents in this regard are examined, it is observed that one of the parents expressed his/her opinions as follows:

“As we say the name of everything, become a model to him...present linguistic inputs suitable for his developmental level...he tries to say something although he doesn’t say the same... He has started to imitate letters and sounds more, and his effort to imitate has increased...” (Tab-E1)

Moreover, in the interviews conducted, the parents stated that there were improvements in the language development of their children. With regard to this, one of the parents stated his/her opinions in the following way:

“Although I have done as much as I can only in the evening on weekends, I think this has contributed to the language development of my child. For example, he didn’t use to say “give,” “open.” He has started to say words such as “Father has come” continuously in the same way. I think it has happened because we are speaking in a way suitable for his developmental level now.” (Tab-E2)

DISCUSSION

The studies demonstrate that parents having children with developmental disabilities are less sensitive and responsive to their children compared to parents of typically developing children, they are also more achievement-oriented and directive (Blacher et. al. 2013; Gilmore and Cuskelly 2009; Kim and Mahoney 2004; Larocci et. al. 2006; Phillips et. al. 2017). In the study in which they compared the interaction of parents having children with Down syndrome and parents of typically developing children with their children, Gilmore and Cuskelly (2009) revealed that parents of children with Down syndrome were more in the role of the teacher toward their children, directed their

children's behaviours more, and were less sensitive and responsive. Thus, the results obtained in this study prior to the implementation are similar to the mentioned findings.

In the study in which Pino (2000) compared the interaction of parents having children with Down syndrome and parents of typically developing children during the play activity and meal routine, the researcher revealed that parents of children with Down syndrome were highly directive especially during the play activity, continuously insisted that their children should learn, they warned their children constantly in this regard, gave instructions and were in a role of helping their children more during the meal routine. As a matter of fact, it can be said that similar results were obtained within the scope of this study. At this point, it was observed that parents directed their children instead of giving them a choice during the snack meal routines, preferred to feed their children by themselves instead of recognizing independence, and some parents did not produce any linguistic input by staying silent for a long time during feeding.

In the interviews conducted with parents within the scope of this study, it was emphasized that most of the parents did not know how to establish quality interaction with their children and how to support the development of their children in natural settings. Indeed, it is observed that parents of children with mental disabilities need communication and interaction skills with their children and need knowledge on how to support the development of their children (Bronfenbrenner 1979; Cavkaytar *et al.* 2012). Thus, McWilliam (2010) argued that parents of children with developmental disabilities need to have knowledge in four areas. These are listed as follows: (a) knowledge of the child's disability status, (b) what services are appropriate for them, (c) general child development, (d) what strategies they can use to support their children's development. At this point, it can be said that the DÖDEM program is important in meeting these basic information needs of parents.

It is revealed that programs implemented within the scope of parent-implemented naturalistic teaching language interventions have an effect on the language development of children. Especially the results of these studies show that significant improvements occur in the language development of children together with the use of responsive interaction and naturalistic teaching strategies by parents (Brown and Woods 2015; Kashinath *et al.* 2006; Kaiser *et al.* 1996; McDuffie *et al.* 2013; Meadan *et al.* 2014b; Meadan *et al.* 2016; Mobayed *et al.* 2000; Moore *et al.* 2014; Peterson *et al.* 2005; Yoder and Warren 2002). As a matter of fact, toward the end of the experimental practice in this study, it was noteworthy that improvement occurred in children's verbal imitation outputs and language development according to what parents told researchers and according to the observations of researchers. At this point, it is thought that an increase occurs in children's verbal imitation outputs, especially when parents start to use a language suitable for children's developmental level and include naturalistic teaching strategies in their daily lives. These findings obtained are parallel to the research findings similar to the objectives of this study in the literature.

Yoder and Warren (2002) emphasized that ensuring parental sensitivity and responsivity was important to ensure that parents were aware of the child's pre-verbal communication efforts and to transform this effort of the child into purposeful communication processes. It is argued that interaction based on joint attention between the parent and child is important in supporting language development. The results of these studies demonstrate that it is very important for parents to be highly responsive to support their children's development in a natural setting by using naturalistic teaching strategies and parental responsivity is accepted as a prerequisite (Yoder and Warren 1998; 1999; 2001; 2002). With this study, it was attempted to form a basis for parents to use naturalistic teaching strategies in the interaction they established with their children in a successful and effective way with a quality parent-child interaction, which was aimed to be acquired before. The obtained findings show that there was significant progress in the interactional behaviours of parents following the DÖDEM program in both ways, face-to-face or via a tablet computer.

The studies demonstrate that parents of children with developmental disabilities in the young age group learn naturalistic teaching strategies, implement them effectively with high implementation

reliability and continue to use the learned strategies over time (Brown and Woods 2015; Fey *et al.* 2006; Kaiser *et al.* 1996; Kaiser and Roberts 2013; Kashinath *et al.* 2006; McDuffie *et al.* 2013; Meadan *et al.* 2014b; Meadan *et al.* 2016; Mobayed *et al.* 2000; Moore *et al.* 2014; Peterson *et al.* 2005). Thus, it can be said that the strategies taught to parents in this study are parallel to the strategies used in the studies in the literature, and the obtained results are similar.

Nowadays, it is observed that with which method or technique to teach parents naturalistic teaching strategies to support their children's development is one of the subjects that continue to be discussed (Meadan *et al.* 2016). In this regard, it is noteworthy that different practices are performed in the teaching of naturalistic teaching strategies to parents. It is observed that parent training is conducted with distance education-based, internet-based, or online applications, especially with the developing technology nowadays (Baharav and Reiser 2016; Hamad *et al.* 2010; Jang *et al.* 2012; Kobak *et al.* 2011; Meadan *et al.* 2016; Wainer and Ingersoll 2012). However, it is stated that studies on this subject are very limited, and there is a need for more studies (Meadan *et al.* 2013; Meadan and Daczewitz 2015; Meadan *et al.* 2016). In this regard, it is observed that the DÖDEM program differs from these studies in terms of the fact that it can be followed remotely via a tablet computer offline, and it is thought that the program makes a significant contribution to the field in terms of providing a different method to parent training, and providing information to parents who cannot access education services for reasons such as time, transportation, and finance.

CONCLUSION

In this study, parent training was provided using two different methods. In this context, it was attempted to reveal the effect of following the DÖDEM program face-to-face (traditional method) and remotely offline as a tablet computer application on the parents' and children's behaviours in terms of the determined variables. The results obtained demonstrated that following the DÖDEM program in both ways contributed to significant improvement in the parents' interactional behaviours and the frequency of use of naturalistic teaching strategies. Especially these findings obtained within the scope of the present study demonstrate that the parents acquired the transferred knowledge and gained the application skill despite following the program remotely via a tablet computer. Thus, it can be said that this process has led to a change in both the parents' and children's behaviours.

Limitations and Directions for Further Research

This study has some limitations. The study could not be conducted with a larger sample due to reasons such as time and resource insufficiency experienced because the study was carried out by a single researcher. In the process of creating groups, the unbiased assignment could not be performed, and the study was designed with the static-group pretest-posttest experimental design among weak experimental designs. Due to the low number of participants, some limitations were experienced in the statistical analysis of quantitative findings. In this context, non-parametric tests were used in the study instead of parametric tests, which were statistically more powerful and ensured better generalization to the population. This situation made it difficult to interpret the results obtained in this study in terms of their generalization to parents of children with Down syndrome and children.

The Bonferroni correction was made in this study to prevent Type I error. However, it is thought that Type II error may have occurred due to the inability to conduct research with a sufficient sample size in the study. Indeed, Armstrong (2014) argued that the possibility of making Type II error might increase while trying to reduce the possibility of making Type I error with the Bonferroni correction, thus, the possibility of type I error could not be prevented by increasing the number of Type II errors, and this could not detect actual differences. Huck (2012) stated that a small number of participants would reduce statistical power and, therefore, suggested that statistical results were open to Type II error. Therefore, it is believed that repeating the study with more research support and

participants will make a contribution to revealing the findings obtained with more powerful statistical analyses.

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