Effect of the Cooperative Learning with Family Involvement Based Science Education on the Scientific Process Skills of 5-6-Year-Old Children

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ABSTRACT

Purpose of this study is to investigate the effect of the cooperative learning with family involvement-based science education on the scientific process skills of 5-6-year-old children. In the study a pre- post-test control group design was used. The data were obtained using the "General Information Form", developed by the researchers, the "Cognitive Process Skills Evaluation Form" and "Semi-Structured Interview Form". The study group consists of 60 children (30 in the experimental group, 30 in the control group) receiving preschool education in the spring semester of 2016-2017 academic year. The cooperative learning-based science education program with family involvement include activities such as eddies, shadows, mirrors, plants' breathing, water power, etc. that can support scientific process skills of children. Data were analyzed using SPSS 22 package program. Since the data has no normal distribution, the Wilcoxon signed-rank test was used for intra-group comparisons and Paired Sample t Test was used for inter-group comparisons. As a result of the study, a significant difference between experimental and control groups was found in favor of the experimental group in the development of scientific process skills of children. According to this result, it can be said that cooperative learning with family involvement-based education program supports the scientific process skills of children of 5-6 years of age. It may be suggested that cooperative learning with family involvement-based science education should be included and popularized in preschool education.

Key Words: Cooperative Learning, Family Involvement, Science, Scientific Process

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Introduction

Children start to acquire many concepts, including the basic concepts, in early childhood. They explore and learn how to think by starting to discover their environment. Actively exploring their environment, children use their senses to make observations, sort out these observations and make inferences (Akman *et al*., 2003). Children who are as curious as a scientist in the preschool period tend to explore, question, discover, learn and make innovations (Holt, 1991). It may be possible to offer a qualitative science education in preschool children by enabling them develop positive attitudes toward science by attracting their attention to the fertility and life of the soil, for example, instead of teaching them that mud is dirty (Seldin, 2008). Some of the basic processes that science has developed are observations, classifications, comparisons, predictions, correlations, communication and interpretation (Howe and Jones, 1998). There are no established standards in preschool education in Turkey, and various programs prepared in accordance with different approaches are implemented preschools.

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However, a decent program can be created by addressing cognitive and social developments together. Interpersonal relations, problem solving, communication and thinking in science education are the reasons behind this fact (Akman *et al*., 2003). In today's information age, it is important to educate individuals who participate in the process actively and capable of accessing, organizing, synthesizing and reasoning the information they need, instead of raising individuals that acquire information passively (Ezmeci and Akman, 2016).

In preschool period children have many basic experiences. Science education occurs in the light of children's curiosity and experience within the scope of a specific program in early childhood education. Science education can be supported not only at school but also outside the school as well (Strife, 2010).

Family involvement includes activities organized to make parents contribute to the development and education of children. Family participation studies are important in terms of permanence and continuity of knowledge learned in the preschool period. With family involvement, it is ensured that what learned in the school are supported at the home, and what learned at home are supported in the school, leading to a permanent learning and desired behaviors in a more controlled manner (Tezel Şahin and Ünver, 2005). Parents provide their children basic information about natural events and living-inanimate objects before prior to formal education (Haktanır and Kan, 2000). They can give their children the opportunity to make simple, interesting experiments at home and let them talk about the results by giving them responsibilities such as watering flowers and feeding animals (Albayrak, 2000). The main purpose in the activities is to teach children how to make science by using knowledge in scientific research instead of making them memorize the information given (Büyüktaşkapu, 2010).

Through their experiences in their daily lives, children are able to perform numerous basic activities (Kuru and Akman, 2017). Children form their basic perceptions regarding science by observing their surroundings and experiencing various experiences (Trundle, 2010). Young children are interested in exploring their surroundings and early basic activities (French, 2004). In the first years of life, children are interested in the natural environment in which they live, living and non-living entities in this environment as well as the natural events such as rain and wind, and try to make experiments and observe the results (Akman *et al*., 2003, Uysal, 2007). Qualitative science activities are vital for understanding the world, gathering and organizing information, testing different ideas, and developing positive attitudes toward science (Eshach and Fried, 2005). In preschool education, science activities are mainly carried out within the framework of basic process skills. When the studies (Özkan, 2015, Büyüktaşkapu, 2010, Turan, 2012, Civelek, 2016, Doğan, 2014, Kuru, 2015, Günşen, 2015, Bartan, 2014, Öztürk, 2016, Kefi, 2014, Dağlı, 2014, Akyol, 2016, Uysal, 2007, Köse, 2006) related to scientific process skills are reviewed, it is seen that the research subjects investigated were the effects of different educational programs on scientific process skills, the relation of scientific process skills with mathematics, language and concept development, the factors affecting scientific process skills, the present scientific process skills of children and the effect of different teaching methods on scientific process skills.

Family is a significant social institution that affects the future life of children. In order for parents to be able to raise socially beneficial children, it is necessary for them to know their child's developmental characteristics, interests and needs as well as allocating quality time and looking after to let them improve their interests and learn certain concepts (Tezel Şahin and Özyürek, 2010, Zembat and Unutkan, 2001). In the Parent-Child Science Education Program, parents are also encouraged to interact with their children in order to support and improve this parental role. Considering the effects of parents on the science education of children, it is important to raise their level of knowledge and awareness, to guide them on how to help their children, and to provide knowledge, skills and behavior in relation to science education. The limited number of studies conducted with family involvement in Turkey and the inadequate number of studies investigating the science education supported by cooperative learning is an important issue in the field of science education which has important place in preschool education. It is believed that the development and implementation of education programs to meet this need will contribute to the development of basic process skills in the early years. For this reason, the purpose of this study is to investigate the impact of the Parent-Child Science Education Program on the basic process skills of 5-6-year-old children.

Methods

Research Model

In the first stage of the research, a validity and reliability study with screening model was carried out for the Basic Process Skills Scale, and in the second stage of the study an experimental design was used with pre-test, post-test and control group. The independent variable of the study is the Family-Child Science Education, and the dependent variables are the child's basic process skills.

Study Group

The study group included children and their parents who attended two preschools selected by random sampling from independent preschools in the province of Malatya, Turkey. Opinions of parents and teachers on the participation in the need's assessment were obtained through face-to-face interviews and on the phone. As a result of the interviews, 72 children's parents and teachers participated in the needs assessment work. Twelve parents and their children, who may experience interruptions in participating in the research, were excluded during the experimental process. In order to eliminate the factors that could affect the internal validity negatively in the experimental process, socioeconomically similar parents were assigned into the experimental and control groups in an unbiased manner to minimize the potential errors. Parents and teachers were interviewed face-to-face or on the phone to inform them about the research, and those who volunteered to participate in the study were identified. It was considered that preschools were in the easily accessible, close neighborhoods with similar socioeconomic levels and children with similar history. A control group was formed in one of the schools and a control group in the other. The experimental and control groups were determined by unbiased assigning. A total of 60 children included in the research, 30 of whom were in the experiment (19 females, 11 males) and 30 in the control group (16 females, 14 males). Of the children in the experimental group, 22 were 60-66 months old and 8 were 66-72 months old. Of the children in the control group, 13 were 60-66 months old and 17 were 66-72 months old. Of the children in the experimental group, 9 were the only child of the family, 14 had one sibling, and 7 had three or more siblings. Of the children in the control group, 11 were the only child of the family, 8 had one sibling, and 11 had three or more siblings.

Data Collection Instruments

Two instruments were used to collect data in the study. These instruments include the general information form created by the researcher to obtain information about parents and children, and the Basic Process Skills Scale developed by the researcher to assess children's basic process skills.

1- General Information Form

This questionnaire was developed to obtain demographic information about parents and children. The questionnaire includes questions about the maternal education status, age, paternal education status, age, child's age (in months), gender, and number of siblings.

2- Basic Process Skills Scale

In order to develop the scale, the studies conducted in Turkey and abroad related to the basic process skills were screened. The literature review carried out by the researcher revealed that the basic process skills of preschool children consisted of five sub-stages. Literature review results and expert opinions were used to create the item pool. For the scale, first a pool of 68 items was created. In line with the expert opinions, the number of items was reduced to 37 for various reasons such non-compliance with basic process skills, being above or below the children's development level, exceeding their attention span, low possibility to be encountered in close environment, reflecting different issues and expectation of high-level skills from children. The resulting scale consists of 37 activities related to science process skills of the 5-6-year-old children. Questions were prepared for each activity and a scale was developed for these questions. The scale was applied individually by the researcher to the children. For the application of the scale, a guiding booklet with pictures and a CD that demonstrate activities was prepared by the researcher. The pictures and activities in the booklet were obtained from various activity books used in preschool education. The researcher applied the scale by asking the questions in the booklet. In order to determine the ideal validity for a measuring instrument, the scale must have a high degree of validity for all techniques; however, in practice this is often not feasible and can be validated by any technique (Hovardaoğlu, 2007). Content and construct validity were assessed to determine whether the items in the scale represent the domain to be measured. Content validity includes a good sampling of the items for the target behavior and evaluations based on expert opinion (Büyüköztürk, 2011). For the content validity analysis, two processes that transform qualitative studies based on expert opinions into quantitative studies: Lawshe technique and Davis Technique (Yurdugül, 2005). Lawshe technique is the most widely used technique. According to this technique, the content validity ratios (CVR) and indices of the candidate measuring instrument are calculated. In order to create the scale, first of all, a draft questionnaire was developed with 68 items. The 68 items prepared by the researchers during the scale development phase of the research were presented to nine academicians who were experts in fields of preschool and child development-education. It is advisable to get opinions of at least five and up to 40 experts, who understand the importance of the study, know the subject of the study can allocate time (Tavşancıl, 2002). Experts were asked to assess the test statements in terms of "reasonableness and comprehensibility" using a three-point rating, which were "Not Appropriate, Partially Appropriate, and Appropriate" and to make recommendations for improvement. For ease of calculation, the minimum values of KGOs at p = 0.05 significance level have been transformed into a table by Veneziano and Hooper (1997), and accordingly, the content validity rate was determined as 0.75 for 9 experts (Yurdugül, 2005). As a result of the expert assessments, no item was removed from the scale since there was no item with a content validity ratio below 0.75 in the Basic Process Skills Scale. Twenty-two items with a goodness of fit value between 90 and 100% were remained the same, whereas 15 items with a fitness value of 70-80% were corrected and included in the scale. The 37-item Basic Process Skills Scale was prepared for pilot study. The scale was applied to 25 children preliminarily. No changes were made in the content of the scale after the pilot study. The scale was applied to 230 children aged five to six years who were randomly selected from all the children in preschools located in neighborhoods with similar socioeconomic and sociocultural status in the province of Malatya. Incorrect answers were scored by zero points, incomplete answers were scored by 1 point and correct answers of the children were scored by two points.

Content validity is the theoretical analysis of whether the items developed measure the variable or to what extent they are related to the variable. Factor analysis and internal consistency analysis techniques are used to provide evidence for construct validity of scales. Factor structure was analyzed within the scope of construct validity, and following the varimax rotation, Kaiser-Meyer-Olkin (KMO) coefficient and Bartlett's test of sphericity used for investigating suitability of the scale for factor analysis, the exploratory factor analysis (EFA), item-total correlations, and the difference between the averages of top- and bottom groups were calculated. The results of the analysis are shown in Table 1.

Table 1 shows the factor loadings of the Basic Process Skills Scale. It is necessary condition to have a KMO coefficient greater than 0.5 and have a significant outcome in the Bartlett's Test of Sphericity (Büyüköztürk, 2011). Before analyzing the factor structure of the scale, the KMO value was calculated and found to be 0.817. Kaiser Meyer stated that it is acceptable to have this value between 0.5 and 0.7, great to have a value between 0.8 and 0.9, and excellent to have this value greater than 0.9 (Field, 2013). The results obtained in the validity analyses (KMO = 0.817, Bartlett's Test of Sphericity = 5592.782, SD = 236, p = 0.000) show that the data are suitable for factor analysis. The normality test was used to test normal distribution of the data. The 12th, 19th, 21st and 28th items were removed from the scale due to their non-normal distribution. The 4th, 9th, 26th, 31st, and 33rd items were removed from the scale due to their low factor loadings. The remaining 28 items were again subjected to factor analysis and 6th item was removed from the scale as it represented both the classification and comparison factors. The remaining 27 items were divided into five factors (observation, classification, comparison, measurement, communication). Incorrect answers were scored by zero points, incomplete answers were scored by 1 point and correct answers of the children were scored by two points. The lowest and highest scores of the scale are 0 and 54 respectively.

Within the construct validity assessments of the Basic Process Skills Scale, the items were analyzed to assess the extent of differentiation between the features intended to be measured by the sub-scales. The scores obtained from the scale were ranked and a total of 124 individuals were selected, of which 62 were from the top 27%, and 62 were the bottom 27% groups. Mann-Whitney U test was used to test whether the sub-scales

Table 1. Basic Process Skills Scale Factor Loadings

Items	Observation	Classification	Comparison	Measurement	Communication
2	.84				
11	.63				
3	.44.44				
29	.76				
32	.75				
8	.82				
25		.75			
20		.59			
37		.56			
1		.76			
7		.82			
15		.44.44			
34			.58		
24			.77		
30			.63		
10			.54		
16			.46		
22				.54	
13				.64	
5				.55	
27				.75	
35				.49	
36					.82
14					.75
17					.46
23					.54
18					.66
Variance Explained (%)	35.68	11.56	6.48	6.08	5.72
KMO	0.817				
Bartlett's Test	5592.782				
Df	236				
Approx Chi-Square	184.132				

Table 2. Mann-Whitney U-Test Results According to the Mean Item Scores of the Bottom 27% and Top 27% Groups Created by the Sub-Scale and Total Scores of the Basic Process Skills Scale

Basic Process Skills Scale		$\bar{x}$	n	95% confidence interval		SD	Row Avg	U	p
				Min	Max				
Observation	Bottom 27%	1.23	62	1.27	1.84	0.86	32	54	0.00*
	Top 27%	1.56	62	2.03	2.45	0.06	68		
Classification	Bottom 27%	1.12	62	1.24	2.05	0.12	32	42	0.00*
	Top 27%	1.53	62	2.36	2.74	0.08	68		
Comparison	Bottom 27%	1.62	62	1.21	1.54	0.12	32	68	0.00*
	Top 27%	1.50	62	1.92	2.08	0.25	68		
Measurement	Bottom 27%	1.35	62	1.42	2.03	0.24	32	59	0.00*
	Top 27%	1.13	62	1.88	1.96	0.09	68		
Communication	Bottom 27%	1.82	62	2.47	2.78	0.22	32	48	0.00*
	Top 27%	1.27	62	2.52	2.76	0.03	68		
Total	Bottom 27%	1.23	62	1.19	1.43	0.14	32	63	0.00*
	Top 27%	1.44	62	2.64	2.84	0.23	68		

**p<0.01*

Table 3. Cronbach's Alpha Reliability Coefficients of the Basic Process Skills Scale

	Observation	Classification	Comparison	Measurement	Communication	Basic Process Skills Scale
Cronbach's Alpha	0.92	0.84	0.82	0.88	0.92	0.94

differentiate the two groups. In the test result, the significant difference between the average total and sub-scale scores of the top 27% and bottom 27% groups (p<0.01) was found to indicate that the scale items differentiate the children's basic process skills significantly.

Test-retest reliability was calculated to determine the degree of consistency (stability) of the scale. As a result of the analysis performed on the data, the Cronbach's Alpha reliability coefficient was calculated as an indicator of the internal consistency and homogeneity of the Basic Process Skills Scale. The Cronbach's Alpha reliability coefficient of the scale was calculated as 0.94.

Table 4. Test-Retest Correlation Results According to the Sub-Scale and Total Scores of the Basic Process Skills Scale

Basic Process Skills Scale		Observation	Classification	Comparison	Measurement	Communication
Observation	r	0.926				
	p	0.00*				
	n	50				
Classification	r		0.912			
	p		0.00*			
	n		50			
Comparison	r			0.882		
	p			0.00*		
	n			50		
Measurement	r				0.904	
	p				0.00*	
	n				50	
Communication	r					0.856
	p					0.00*
	n					50

*$p<0.01$

Table 4 shows the test-retest correlation results of the five sub-scales cores and total score of the basic process skills scale. It is seen that the correlation between the scores of the five sub-scales and the total score of the tests conducted with two-weeks of interval was very high. The correlation coefficient was 0.926 in the observation sub-scale, 0.912 in the classification sub-scale, 0.882 in the comparison sub-scale, 0.904 in the measurement sub-scale, 0.856 in and the communication sub-scale. It was determined that there was a significant relationship between the scores obtained from both tests ($p<0.01$).

Parent-Child Science Education Program

Prior to preparing the training program, a needs assessment study was conducted with the parents. In the needs assessment study, 120 parents participated. The "Parent Needs Assessment Form" was developed by the researcher to determine the needs of the Parent-Child Science Education Program and the expectations of parents about the program. Before the application of the questionnaire, parents were informed about basic process skills by giving examples. A training program consisting of 24 sessions for 12 weeks was prepared in line with the information obtained from the needs assessment studies. Parent education programs aim to systematically develop the knowledge, attitudes and skills necessary for the upbringing of children, family relationships, and parental obligations in the family and society. The main purpose of the training is to strengthen the self-confidence of the parents and to guide them to develop maternal skills for physical, mental, social, emotional and language development of their children. Some of the programs implemented are intended to provide services directly to the child, his/her inner circle, and some to both the child and the parents (Sanders, Turner & Markie-Dadds, 2002). Parent-Child Science Education aimed at providing services to both the children and their families. In the second stage, the Parent-Child Science Education Program was prepared. The program was designed to develop basic process skills of five-to-six-year-old children through activities to be performed with their parents, named "Meadows, Dances of the Shadows, Movements of the Planets, What Floats What Sinks, I am Conducting Experiments, We are Preparing Menus, How Long, How Full, How Heavy", and so on. There are a total of 48 activities including ten for observation, ten for classification, ten for comparison, nine for measurement and nine for communication. The opinions of five experts were obtained in the development of the program. Experts were asked express opinions bar marking one of the "appropriate," "partially appropriate" and "not appropriate" options and write their views in the explanation area regarding the appropriateness of the children's activities to the objectives, adequacy of the session contents in reflecting the subject matter, the intelligibility and clarity of instructions, the appropriateness of the activities to the determined achievements and indicators, and the appropriateness of the sessions to the content. The program was corrected in line with expert opinions and the materials to be used were prepared and made ready for implementation.

Data Analysis

Data were analyzed using SPSS 22 (Statistical Program for Social Sciences) package program. Using appropriate statistical analysis to assess the data obtained in the study increases the reliability of the study and ensures that the results are interpreted consistently (Çepni, 2007). To obtain statistical results, it is necessary to test whether the data obtained in the study show a normal distribution. In normality tests, Curvature, Normality, D 'Agostino Pearson, Anderson Darling, Chi-square, Lilliefors, Kolmogorov-Smirnov, Jargue-Bera and Shapiro-Wilk tests can be used. The Shapiro-Wilk test is more powerful than the other tests. When the normal and non-normal distributions are considered together, the Shapiro-Wilk test gives the best result than other tests and it is recommended in cases where the number of samples is 7 < n <= 2000 (Büyüköztürk, 2011). Normal distribution of quantitative data was tested by Shapiro-Wilk test. Descriptive statistical methods (Avg., SD) were used in the analysis of the study data. Dependent Groups t test was used for intra-group comparison of variables with the normal distribution and Wilcoxon Marked Rank Test was used for intra-group comparison of variables with the non-normal distribution. In the study, statistical significance was accepted as p<0.05.

Results and Discussion

In this section, the results obtained in the study were discussed and interpreted with the help of tables.

As can be seen in the Table 5, there is no significant difference between the mean pre-test scores in all sub-scales of the Basic Process Skills Scale (p>0.05). According to this result, it can be considered that the experiment and control group are equivalent to each other. In other words, it can be said that the differences in the development of children's basic process skills can only be influenced by the actions to be made to the experimental and control groups, assuming that the independent variables, which cannot be controlled, affect the experimental and control groups in the same way. In terms of the observation sub-scale scores of the children in the experimental group, the increase between pre- and post-test score averages was found to be statistically significant (p=0.001, p<0.01). In terms of the classification sub-scale scores of the children in the experimental group, the increase between pre- and post-test score averages was found to be statistically significant (p=0.000, p<0.01). In terms of the comparison sub-scale scores of the children in the experimental group, the increase between pre- and post-test score averages was found to be statistically significant (p=0.002, p<0.01). In terms of the measurement sub-scale scores of the children in the experimental group, the increase between pre- and post-test score averages was found to be statistically significant (p=0.003, p<0.01). In terms of the communication sub-scale scores of to be statistically significant (p=0.000, p<0.01).

The significant difference between the pre- and post-test basic process skill scores of the children in the control group can be explained by the time-dependent improvement in the basic the children in the experimental group, the increase between pre- and post-test score averages was found process skills, their increased awareness caused by their discoveries in the environment, daily life experiences, differences in parental

Table 5. Comparison of Pre-Test and Post-Test Sub-Scale and Total Scores of the Basic Process Skills Scale in the Experimental and Control Groups

Basic Process Skills Scale		Experiment	Control	Test Value	p
		Mean±SD	**Mean±SD**		
Observation	Pre-test	4.12±0.35	4.25±0.15	t:0.891	0.082
	Post-test	5.52±0.23	5.46±0.72	t:1.257	0.001
	Achievement	0.36±1.02	0.17±1.42	Z: -1.368	0.004
Classification	Pre-test	4.54±0.26	4.08±0.18	t:2.416	0.072
	Post-test	5.02±0.52	5.00±0.03	t:1.822	0.000
	Achievement	0.16±0.05	0.12±0.51	Z: -2.346	0.004
Comparison	Pre-test	4.25±0.11	3.39±0.28	t:2.411	0.074
	Post-test	5.02±0.12	4.32±0.53	t:1.875	0.002
	Achievement	0.67±1.08	0.46±1.11	Z: -1.586	0.024
Measurement	Pre-test	3.45±0.41	3.55±0.14	t:1.615	0.065
	Post-test	4.72±0.16	4.08±0.05	Z: -2.189	0.003
	Achievement	0.43±1.13	0.09±1.16	t:2.163	0.002
Communication	Pre-test	4.55±0.16	4.24±0.01	t:2.069	0.086
	Post-test	5.93±0.07	5.32±0.17	t:3.465	0.000
	Achievement	0.67±1.23	0.09±1.52	Z: -2.019	0.036
Total	Pre-test	4.95±0.11	4.55±0.18	t:2.052	0.058
	Post-test	5.85±0.01	5.82±0.38	t:3.526	0.034
	Achievement	0.87±1.23	1.30±0.20	Z: -2.213	0.023

attitudes, awareness raised about the basic process skills during the pre-test, and the achievements and indicators in MEB 2013 Curriculum aimed at teaching science concepts and science process skills.

In terms of the basic process skills, the increase between pre- and post-test scores of the children in the experimental and control groups was found to be significant in favor of the experimental group in all sub-scales (Z=-2.213, $p<0.05$). According to this finding, it can be argued that the changes that occur in children's basic process skills are due to the effect of the training applied to the experimental group, and that the activities make the children in the experimental group more successful in terms of their skills. Science education starts primarily in the family, so parents assume the role of first science teacher of children (Yaşar, 1993). If parents participate with faith and sincerely in doing science with children, their children will be encouraged to wonder, explore, investigate and make real science through opportunities from the real-world experiences (Lindblom and White, 2011). At the same time, the family can make preschool children like the science-related topics (Yaşar, 1993). Children who tend to actively explore their surrounding use their senses to make inferences from observations, satisfy their curiosity, talk with their parents and seek answers to questions in their minds (Akman, 2003). The National Science Teachers Association (NSTA), which is a system that promotes teachers' professional development in science teaching in cooperation with early childhood education units, emphasizes that all parents working with children should be supported and that their participation in science education process is very important for children's ability to learn science. Parents should create a positive and trustful environment at home for the development of their children's research, investigation, and exploration skills (Kefi, 2014). Civelek (2016) found that open space activities are more effective than classroom activities in improving children's gains in scientific process skills. Büyüktaşkapu (2010) reached the conclusion in his study that the science curriculum based on constructivist approach supports the science process skills of 6 year old children. Özkan (2015) found a significant difference, in favor of the experimental group, in the total scores taken by the children in his study, which investigates the effect of brain-based science learning program on the science process skills of 60-72 month-old children. In his study, conducted to investigate the effect of creativity-centered science education provided to children together with their parents in integrated Montessori classes on the science learning capabilities of children, Gomes (2005) found that the education significantly supported the opportunities of children for learning by doing and their meaningful learning experiences. In a study by Günşen (2015), which investigated the effects of constructive approach based science education on five-year-old children, many science concepts (Magnet, Space, Heredity, Sun and Solar Energy, Micro creatures, Volcanoes and Dinosaurs, Color, Battery, Acid and Weather [Meteorology]) have found to be improved after their participation in Constructive Approach based Science Education Program. In Öztürk's (2016) study, which has been conducted to determine whether the Inquiry Based Science Education Program affect conceptual, linguistic and science process skills of 60-72 month-old children attending preschool education, the results have showed a significant difference between conceptual, linguistic and science process skill scores of the children in the experimental and control groups in favor of the experimental group. İrkörücü (2006) found in his study that the home-based mathematical support program supports the measurement skills of preschool children. The study by Şahhuseyinoğlu (2010), which investigates the relationship between the experiences of parents of 6-year-old children and children's science learning outcomes, has found that these children learned a lot from science activities and that they started to gain different perspectives when presenting their works to their peers as well as starting to understand how they learn. In their study, which investigates the relationship between individuals' desire to be a scientist and factors affecting in the preschool period, Jones, Taylor & Forrester (2011) found that children's observation towards family members in the preschool period increases their tendency to become scientists. In their study that investigates scientific thinking in daily parent-child activities, Crowley *et al*., (2001) have observed children's communication with their parents in a museum and followed up how their scientific thinking develop everyday life. Looking at research results of this study, it is seen that the findings support the results of other studies. According to the results of the present study, it is seen that Parent-Child Science Education places children at the center in science education, promotes their active participation, increase their interaction with their parents, enabled them to focus their attention and provides basic process skills in a more effective and permanent manner as well as ensuring participation of parents in the science process more, compared to the 2013 Preschool Curriculum of the Ministry of Education.

Conclusions

This study was conducted to investigate the impact of the parent-child science education program on the basic process skills of 5-6 year old children. The study group of the study consisted of 60 children, of which 30 were in the control and 30 were in the experimental group. There was no significant difference between mean pre-test scores in terms of total basic process skills scale score and sub-scale scores of the children in the experimental and control groups ($p>0.05$). In terms of the total basic process skills scale score and the mean sub-scale scores of the experimental and control groups, a significant difference was found between the mean post-test scores in favor of the experimental group ($p<0.05$). In terms of the total basic process skills scale score and the mean sub-scale scores of the experimental and control groups, a significant difference was found between the mean pre- and post-test scores in favor of the experimental group ($p<0.05$).

Findings from the research can be used to provide suggestions for researchers:

- It can be suggested to establish training centers in cooperation with higher education institutions, media and voluntary organizations in order to disseminate the education towards the development of basic process skills. Counseling services can be provided to parents, caregivers and preschool teachers in these training centers.
- It may be advisable to prepare brochures, booklets, etc. materials on the improvement of the basic process skills of preschool children and deliver them to their families with home visits.
- Science Education Centers can be opened in disadvantaged areas and education programs and activities for parents and children can be developed by educators.
- In this study, a 12-week training program consisting of 24 sessions of 45 minutes two days a week was applied. After this process, monitoring activities can be performed at certain intervals. In addition, the results of the short- and long-term training programs can be compared by providing longer-term training for parents and children in the future studies.

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