ORIGINAL ARTICLE

Evaluation of Parents' Views on An Early Childhood Science Program Including Activities in Out-of-School Learning Environments

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***Abstract**: Young children's instinctive curiosity is essential in early childhood science education. Efficacious science education is associated with the characteristics of a qualified science program and an effective learning environment. The out-of-school learning environments make it easier to achieve the aims of science education in early childhood with their opportunities and advantages. This single case study aimed to reveal the views of the parents of children aged 60-72 months who participated in an early childhood science program that included science activities in out-of-school learning environments, in the classroom, and at home. The Program, which included parent involvement activities in the classroom, out-of-school learning environments and at home, was implemented for seven weeks. After completing all activities of the Program, the data obtained from the interviews with the parents were analyzed. The findings showed that parents were interested in science and supported their children regarding science subjects, spent time at home on science activities, and visited out-of-school learning environments with their children. It was determined that the out-of-school learning activities of the Program contributed a lot to the child, and the studies of parent involvement at home contributed variously for both the child and the parents. The Program was effective as a whole and parents requested its implementation throughout the school year. Based on these findings, in this research, we discussed the importance of frequently including science activities in out-of-school learning environments and classroom activities in early childhood and the parents' involvement in the science education process as valuable stakeholders.*

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Introduction

"WHAT is science?" There is no doubt that there is no single answer to this question. Paulu and Martin (1992) have defined science as observing what's happening, predicting what might happen, testing predictions, and trying to make sense of our observations. Science is a "body of knowledge" or a "body of facts" associated with particular disciplines such as biology, physics, chemistry, geology, astronomy, psychology, information and communication technology, and so on) (Johnston, 2005, p.10-11). Science involves the process of trial, error and retries (Paulu & Martin, 1992), and this process brings about discoveries. Therefore, science is a process of research, discovery and understanding (Uludağ & Erkan, 2020). Uludağ and Erkan (2020) defined science as acquiring knowledge about the world by using the innate sense of curiosity, discovery and learning, and the ways of reaching knowledge (p.3).

Science is an exciting topic that attracts young children. Because children like to know how things are, and science encourages them to test how things work. Science, which is highly related to other fields, provides recognition and understanding of the world (Kelly, 2015). Young children's curiosity about their daily lives and the world around them improves scientific concepts, knowledge, skills and attitudes. The equal development of these scientific concepts, knowledge, skills and attitudes is essential for children not to develop alternative conceptions or misconceptions and positive scientific attitudes (Johnston, 2005).

Science Education in Early Childhood

The aim of science education in early childhood is to improve children's knowledge of the world and to help them learn the methods to be used in discovering, evaluating, reviewing and communicating this information, and to nurture, enrich and sustain their natural interest in scientific knowledge (Klahr et al., 2011). In early childhood, science education should provide active participation of children in the process with a qualified program, enable hands-on experiences, be child-centered, develop a positive attitude towards science, include knowledge and skills that will form the basis for better understanding of scientific concepts and future science learning, enable acquiring knowledge and getting to know the world by using sensory organs, and develop science process skills (Conezio & French, 2002; Hachey & Butler, 2009; Mantzicopoulos et al., 2008; O'Connor & Rosicka, 2020; Pattison & Dierking, 2019).

There are three main content areas of science education in early childhood: life sciences, physical sciences, earth and space sciences (Charlesworth & Lind, 2013; Lester, 2007). Children need to understand and

use these areas, focusing on science events, concepts, principles, theories and models (National Research Council [NRC], 1996). Today, engineering, technology and science applications are also included in the content (NRC, 2012). Characteristics, biology and ecosystems of living organisms in children in the context of life sciences; properties of matter, sound, motion and energy in the context of physical sciences; In the content of earth and space sciences, it is aimed to structure the concepts of the Earth's place in the universe and its systems, and the effects of human activities on these systems (Vermont Early Learning Standards, 2015). A qualified science program and an effective learning environment have a fundamental role in achieving the goals of early childhood science education and in helping children learn science content.

Out-of-School Learning Environment

The themes and key issues of 21st-century skills, emphasized in this century, are built on four support systems, one of which is "learning environments" (Partnership for 21st Century Learning, 2019). It is known that appropriate learning environments positively affect child development (Özbay-Karlıdağ, 2021). Learning experiences of young children are best realized in environments where they can use all their senses (Kostelnik et al., 2014). The out-of-school learning environments (OSLE) appeal to children's senses and stimulate them.

Museums, botanical gardens, zoos, science centers and aquariums are OSLE and associating activities in these environments with the curriculum and achieving learning outcomes is defined as out-of-school learning (La çin-Şimşek & Öztuna-Kaplan, 2022). OSLE start with the school garden and spread towards the immediate environment (Loxley et al., 2010). Using these environments in science education is interesting for children, increases learning motivation, develops scientific and social skills, develops positive attitudes towards science, and makes learning in the classroom permanent and meaningful (Öcal & Uludağ, 2022; Guardino et al., 2019). Therefore, parents' use of these environments is as important as teachers' use of these environments. Because one of the essential stakeholders in qualified science education is parents.

Parent's Role in Science Education

Young children's first informal science experiences occur in their interaction with their parents (Crowley et al., 2001). Parents may not have a strong science infrastructure to experience science with their children, but there are many opportunities to learn science in everyday life. For example, how long it takes for a rose to bloom fully, to monitor and record changes in the Moon, to monitor/track a kitten's growth, to make cakes together, etc. (Paulu &

Martin, 1992). These informal experiences can also be transformed into a more planned process with home-based and school-based parent involvement activities when the child starts school.

Parent involvement refers to parents' activities to support children's education (Camarero-Figuerola et al., 2020). Parent involvement is discussed in two groups as participating in school and home activities (Martinez, 2015). Parent involvement in science education is strongly recommended (The National Science Teachers Association [NSTA], 1994). Parents encourage the daily use of their children's science concepts and process skills, helping them develop the skills necessary for success. NSTA (1994) recommends that parents give the child time to do science, listen to and talk to the child's questions, not avoid saying what they don't know, and be eager to seek answers to questions. Parents should also encourage the school to do science activities and explore OSLE such as museums, airports and recycling centers with the child.

Aim of the Research

The current research aimed to reveal the views of parents of children who participated in an early childhood science program that included science activities in OSLE, in the classroom, and at home. The following research questions (RQ) were addressed with the study;

RQ1. Are parents interested in science, and how does the child answer questions about science?

RQ2. Do parents do science activities at home with child and visiting science-related OSLE?

RQ3. According to the parents, what are the contributions of science-related OSLE to the child?

RQ4. What are the parents' views on the contribution of the Program's activities in OSLE and parent involvement at home?

RQ5. According to the parents, what are the Program's contributions as a whole to child?

RQ6. What are the parents' interest in the Program and the reasons for their interest?

Method

Research Model

The research is a descriptive case study and has a holistic single-case design. Descriptive case studies deal with the "how" of a situation. The holistic single case design covers a single unit of analysis (such as individual, organization, and program) and is used to investigate unique situations and topics that

have not been studied before (Yin, 2018). This research is about describing the effects of a specific program.

Study Group

The research included the parents of 27 children aged 60-72 months who attended an official kindergarten and participated in the Program (mother: 18, father: 9). The demographic characteristics of the parents were as follows: 41% of their mothers and 60% of their fathers were between the ages of 35-40. 74% of mothers and 66% of fathers had bachelor's degree. 37% of mothers and 48% of fathers were self-employed.

In the selection of the school where the Program was applied, the physical facilities of the school, the willingness of the school administration, parents and classroom teachers to participate in the research, and the absence of children in any other research during the time period in which the research will be conducted were taken into consideration. In addition, since science activities were carried out in both classroom and OSLE, it was considered that the school was in the city center for ease of transportation and more effective use of time. In order to carry out science activities in the school garden, security measures were taken (being surrounded by fences etc.) and the choice was made among the schools, the ground of which were not covered with asphalt, with a garden with trees, soil and green areas.

Content and Implementation of the Program

The Program was prepared by the researchers in line with expert views to support the science process skills of children aged 60-72 months (Uludağ & Erkan, in press). The Program consists of science activities in the classroom and OSLE and parent involvement activities at home. In the Program, which includes large and small group activities, there are 36 activities in total, 21 in the classroom and 15 in OSLE. Based on the constructivist and science process approach, the Program has seven gains and 24 indicators for observing, comparing, classifying, measuring, data recording/communicating, inferring and predicting skills. The Program includes life sciences, physical sciences, earth and space sciences. The Program's table of specifications is presented in **Table 1** (Uludağ & Erkan, in press).

The Program's activities in the classroom and OSLE (Aquarium, Insect Festival School (IFS), Natural History Museum, Planetarium, Science Center, Veterinary Anatomy Museum, school garden) were carried out by the researcher for seven weeks, three days a week, in the classroom (Photograph 1-2) for 45-50 minutes each, and OSLE for 2-3 hours once a week (Photograph 3-8, taken by the researchers). In the evaluations made at

Table 1. The Program's Table of Specifications.

Wk	Activity No	Content Area	Environments	Observing	Comparing	Classifying	Measuring	Data recording/ communicating	Inferring	Predicting
1	1	LS	Classroom	*	*					
	2	LS-PS	Classroom	*	*	*				
	3	LS-PS	Classroom	*	*	*			*	
	4-5	LS-PS	Science Center	*	*			*	*	*
2	6-7	PS	School Garden Classroom	**	**	*		**		
	8	PS	Classroom	*				*	*	
	9	PS	Classroom			*		*		
	10-11	PS	Veterinary Anatomy Museum	*	*			*	*	*
3	12	LS-PS	Classroom		*		*		*	*
	13	LS-PS	Classroom						*	*
	14	PS	Classroom			*	*			*
	15	PS	Aquarium	*	*	*		*		*
4	16	LS-PS	Classroom		*	*			*	*
	17	ESS	Classroom				*		*	*
	18	PS-ESS	Classroom			*	*		*	
	19-20	LS-PS-ESS	Natural History Museum	*	*			*	*	
5	21	LS-ESS	Classroom	*			*	*		*
	22	PS-ESS	Classroom		*				*	*
	23	PS	Classroom	*					*	*
	24-25	LS-PS	Science Center	*	*		*		*	*
6	26	PS-ESS	Classroom				*	*		*
	27-28	LS-ESS	School Garden-Classroom	**		*			*	
	29	LS-ESS	Classroom			*	*	*		
	30-31	LS	IFS	*	*	*	*		*	*
7	32	ESS	Classroom				*		*	*
	33	ESS	Classroom	*				*	*	*
	34	PS	Classroom			*	*	*		
	35-36	PS-ESS	Planetarium	*					*	*

***Shows the scientific process skills related to the activity in the school garden (LS=Life Sciences, PS=Physical Sciences, ESS=Earth and Space Sciences)*

the end of the Program, it was determined that the Program positively affected children's science process skills (Uludağ & Erkan, in press).

Within the scope of the Program, complementary worksheets prepared for the activities of the children during the week were delivered to the parents by the teacher every Friday. These worksheets included activities

Photograph 1. Classifing of Seashells.
Photograph 2. Recognize Non-Standard Measurement Tools.
Photograph 3-4. Museum of Veterinary Anatomy - Examination of Frozen Samples.
Photograph 5. Science Center-Milk Experiments Workshop (Structure of Milk).
Photograph 6. Natural History Museum- Examination of the Cave Model.
Photograph 7-8. Aquarium-Various Marine Animals and Snake Observations.

to reinforce children's learning in the OSLE they visited and carried out activities in the relevant week, activities to support science process skills, and information notes about the OSLE to be visited the following week. These worksheets aimed to increase the effect by repeating and reinforcing children's knowledge and involving parents in the process. Parents did the activities on the worksheets with child and delivered the worksheets to the teacher on the first school day of each week. For example, in the worksheets, there were tasks such as chatting with children about the out-of-school learn-

Picture 1. A Drawing of the Aquarium Activities.

Child: "This is the tunnel we passed through, the stingrays were passing over us, here are they, I saw the biggest stingray, I saw their eyes, this is the crocodile I drew. I never thought I'd see a real crocodile (Laughs). It was moving very slowly, and I drew it here as moving slowly."

Picture 2. A Drawing of the Activities of the Natural History Museum.

Child: "I drew the jaguar that we saw, this is the cave that we entered, the voices echo in the cave, that is the flying dinosaur, they are no longer alive, that's the tree trunk that we saw. We know the age of the trees from these lines. I also saw the fossils; I drew them all differently because there were slightly different ones."

ing environment in which the activity was carried out in the relevant week, asking children thought-provoking questions, asking children to draw the objects/events they saw in the out-of-school learning environment and to explain their observations through these drawings (**Picture 1-2**), doing activities that support science process skills (comparing and sorting the cards showing the life cycle of the chick, chatting about similar and different characteristics of family members, conducting simple experiments and noting the processes with the child's expressions, etc.). These worksheets from the parents were filed in separate folders for each child, thus ensuring that the tasks were performed.

The data were obtained through interviews using an open-ended questionnaire prepared by the researchers. In the first part of the form, questions about the parents' age, parent type (father-mother), education level and profession were included; in the second part, questions about whether the parent is interested in science, the status of children's answering science questions, the status of carrying out science activities with the child and visiting OSLE, and their views about the contributions of science-related OSLE to the child were included. The questions in the second part aimed to determine the parents' views on science and on performing science activities with their children; thus, it was aimed to obtain preliminary information for the answers to the questions in the third part. In the third part, questions were asked to determine their views on the Program's activities in OSLE, parent involvement activities at home, their contributions in terms of children and the request for implementation. The average duration of the interviews was 40 minutes.

Data Collection

The data were obtained immediately after the completion of the Program's activities. Necessary ethical and official permissions were obtained before data collection. Participants were told that participation in the research was voluntary and that they had the right to withdraw at any time. Confidentiality and anonymity were guaranteed. Some of the interviews were conducted face-to-face, and the researchers noted the answers given in writing. It was determined that some parents could not participate in the face-to-face interview due to reasons such as their work life, the presence of another child/ other children in need of home care, and the lack of transportation to school. In this case, the data collection tool was delivered to the parents by the teacher in printed form, and phone calls were made to willing parents.

Data Analysis

The data were analyzed using content analysis techniques. The content analysis aims to reach concepts and relationships that explain the collected

data, and similar data are gathered and interpreted within the framework of specific concepts and themes (Çepni, 2014). In this respect, the data were first read within the predetermined framework in the research. As a unit of analysis, words were used, codings were made according to the concepts extracted from the data, and direct quotations that could be used in the meantime were also noted. Then, the similarities and differences between the codes were reviewed, and the themes were obtained. The data organized in this way were supported by direct quotations. Two researchers carried out the analysis process independently, and the formula (reliability=number of agreements/total number of agreements + disagreements) was used to reveal the coder reliability (Miles & Huberman, 1994, p.64). As a result of the calculation, the percentage of agreement between the coders was determined as 91%. It is recommended that the inter-coder reliability rate should be 90% and above (Miles & Huberman, 1994). Codes assigned to parents for use in reporting data and direct quotations were presented in the findings.

Findings

Parent's Interest in Science and Answering the Child's Science Questions

According to the findings obtained within the scope of RQ1, all parents stated that they were interested in science and tried to clearly and understandably answer the child's questions about science. However, some of the parents stated that they investigated the answer of the question with the child (n=8), some tried to explain the answer to the child's question with examples and practices (n=6), and some parents stated that they encouraged the child to ask more questions (n=2). (n= the number of participants). The samples of parents' quotes follow:

> *Parent 1: "I am interested in science. I am happy when I see my child's desire to learn something. I explain it to him/her in a way that he/she can understand and make him/her understand by giving examples."*

> *Parent 3: "I'm interested in science. Because I'm a chemist, my daughter knows university life very well. We're going to the lab with him, and he knows how to experiment. Since I work at home, he has an interest in science subjects. I explain his questions in the most detailed way and explain them with practices; we spend time together this way."*

Performing Science Activities at Home with Child and Visiting Science-Related OSLE

According to the findings obtained within the scope of RQ2, some of the parents stated that they did science activities at home with their child (n = 17), while some of the others stated that they could not do science activities at home with their children because of lack of time (n = 5) and some of them stated that they did not know what to do (n = 2). Three parents stated that they did not do science activities with their children. However, they only did science activities at home with children within the scope of the Program's parent involvement activities. The samples of parents' quotes follow:

> *Parent 9: "Yes, sometimes we do. For example, we studied how the seed became a plant. We planted seeds in the pots, growing flowers, parsley and onions. We examined them."*

> *Parent 4: "No (we can't do the activity). Because we are working very hard and we do not have time."*

Twenty-four parents said they visited their children's science-related OSLE. The OSLE that parents visit with the child were the zoo (f = 15), the greenhouse/botanical garden (f = 8), the aquarium (f = 5), the science center (f = 3), the science museum (f = 2), the natural history museum (f = 2) and nature (f = 2). Three parents stated that they could not make such visits due to their busy working life [f = Frequency of code in data (raw count)].

The Contribution of Science-Related OSLE to Child

According to the findings obtained within the scope of RQ3, the codes and frequencies related to the contribution of science-related OSLE to child are presented in **Table 2**.

According to **Table 2**, parents thought that OSLE mostly aroused curiosity in children and led them to explore. The samples of parents' quotes follow:

> *Parent 27: "We visited many museums, science museums, botanical gardens and zoos. My son mostly asked why and how questions in these places we visited. Many things attracted his attention, and he remembered the information even after a long time."*

Table 2. The Contribution of Science-Related OSLE to Child.

Environment	Code	f*
Zoo/Aquarium	Arousing curiosity	10
	Raising awareness for animal protection	7
	Leading to discovery	3
	Helping to overcome the animal phobia	2
	Providing a permanent learning opportunity	2
Greenhouse/Botanical garden	Leading to discovery	4
	Ensuring that child learns about plants	4
Science center/Science museum	Arousing curiosity	3
	Providing concrete learning opportunity	2
Natural history museum	Leading to discovery and research	2
	Providing a permanent learning opportunity	2

**: Frequency of code in data (raw count)*

Table 3. The Contributions of the Program's Activities in OSLE.

Theme	Code	f*
Learning process	Awakening the desire to learn	21
	Making the learning process enjoyable	10
	Providing new learning	4
	Ensuring that learning is permanent	2
	Making children want to go to school	2
Development of science process skills	Developing communication skills	12
	Improving observing skills	8
	Improving comparing skills	2
	Developing predicting skills	4
	Developing inferring skills	4
Science learning	Increasing interest in science/science subjects	12
	Increasing the use of scientific terms and descriptions	4
	Arousing interest in OSLE	2
Development	Helping to reduce animal phobia	3
	Increasing love for animal	2
	Increasing self-confidence	2

**: Frequency of code in data (raw count)*

Parent 24: "We went to the zoo and aquarium. This place allowed him to get to know animals and overcome his fear of animals a little bit. He began to wonder how the animals were fed and how they were born."

The Contributions of the Program's Activities in OSLE and about Parent Involvement at Home

According to the findings obtained within the scope of RQ4, the themes, codes and frequencies obtained from the views on the contribution of the Program's activities in OSLE to children are presented in **Table 3**.

According to **Table 3**, the activities of the Program in OSLE contribute mostly to the children's learning process. In addition, the parents stated that the activities improved science process skills, increased their interest in science-related subjects and positively affected their development. The samples of parents' quotes follow:

> *Parent 5: "He describes all events in detail. That his hair flew electrically at the Science Center, he made experiments with vinegar, everything. All the activities and trips made him go to school excitedly. He studies everything he sees more and more in detail now. He establishes cause-effect relationships. "*

> *Parent 10: "He returned very happy from all his trips. When he came home, he gave detailed information about the events he had experienced that day. He fondly described the fish in the aquarium, the skeletons in the natural (historical) museum, and so on. He has started to make more observations; he is examining his surroundings in more detail. He also wants scientific explanations for any event. He thinks the word science is very important. It's certainly easier for him to learn that way."*

The contributions of the Program's activities about parent involvement at home were grouped into two groups for child and parent. The themes, codes and frequencies obtained from the views are presented in **Table 4**.

According to **Table 4**, the learning process is first in the category of contributions for children. In this theme, it is seen that parents think that their children enjoy working with them and learning the Program worksheets at home and that this practice is educational and instructive for children. However, some parents stated that their children started to be curious about science and their interest increased. Some contributions are improving children's self-confidence and strengthening their communication skills. In addition, parents stated that the worksheets of the Program guided them in carrying out science activities with children at home. The samples of parents' quotes follow:

Table 4. The Contributions of the Program's Activities About Parent Involvement at Home.

	Theme	Code	*f**
For Children	Learning process	That it is enjoyable	15
		Being educational/instructive	11
		Reinforcing learning	3
		Improving vocabulary	1
	Science	Increasing curiosity/interest in science/science subjects	8
	Improvement	Increasing self-confidence	2
		Strengthening communication skills	2
For Parents	Counselling	Providing counselling in carrying out science activities	5
		Offering the opportunity to follow up on the development of children	2
	Interaction	Facilitating communication with children	3
		Providing the opportunity to get to know children	2

**: Frequency of code in data (raw count)*

Table 5. The Contributions of the Program as A Whole to Child.

Theme	Code	*f**
Science learning	Willing to learn about the science	18
	Using scientific terms and making scientific explanations	5
	Asking more questions on various science topics	5
	Requesting science materials from the parents	2
	Awakening the desire to be a scientist in children	2
Learning process	Willingness to research and discovery	11
	Enjoying the learning process	7
	Permanent learning	5
	Willing to share learned information	2
	Starting to like the school	1
Development of science process skills	Developing communication skills	7
	Developing observation skills	3
	Developing inference skills	3

**: Frequency of code in data (raw count)*

Parent 9: "As soon as he comes from school, he asks about these activities. –Mom, let's see what's going on- (on the worksheets). –Let's do it, he says. He's started to be interested in everything. When the activities are over, he says, "Any more"? So we started

to do other experiments, activities, and research information from the internet."

Parent 12: "I think it reinforces everything he has learned and more within the Program. He talks about it all the time. He started talking more about science at home. He shared what he saw and learned through these activities (on the worksheet). These events have been a guide also for me. I have learned what my child can understand and learn."

The Contributions of the Program as A Whole to Child

According to the findings obtained within the scope of RQ5, the themes, codes and frequencies related to the contribution of the Program as a whole to the child, according to parents' views, are presented in **Table 5**.

According to **Table 5**, parents think that the curriculum contributes mainly to the child in science learning; at the same time, it contributes variously to the development of the learning process and science process skills. The samples of parents' quotes follow:

Parent 11: "He says he loves science. His attention and interest in his environment increased. He's questioning everything now. He asks us why-how everything he sees is done, he wants to learn more, and he is very happy."

Parent 8: "My child has become a child who wants to experiment thanks to the Program. He's also waiting for a scientific explanation for every incident. He thinks the word science is very important. While watching cartoons at home, I observed that he started to choose those content that includes experiments and describes animals. And the questions he asks amaze me. Planets, day and night formation, germination of seeds, the natural life of insects... He explains many subjects in his own words and tries to teach us. He also wants to know what he doesn't know."

Parent 27: "His curiosity for science has increased, and he wants to be a scientist. Actually, he always said he wanted to be a painter. He questions the before and after of every event that happens around him. He began to look for a reason as to why this had happened. He draws pictures of how it rains. He tells the lava of volcanos. He excitedly describes the science activities we do at home to our family elders as a discovery, which makes us very happy. This is spectacular."

Parents' Interest in the Program and the Reasons for Interest According to the findings obtained within the scope of RQ6, the implementation period of the Program is seven weeks. However, all of the parents demanded that the content of the Program be applied for one academic year. Because according to parents, the Program is a program that is fun/instructive (f = 10), effective/successful (f = 7), efficient/useful (f = 4), enjoyable/entertaining (f = 4), engaging (f = 3), different (f = 3), allows parent involvement (f = 3), supports the development of the child (f = 2), is loved by children and is wanted to continue (f = 2). The samples of parents' quotes follow:

> *Parent 13: "I want it to continue. So does my daughter. He says he wants to learn more and see new places."*

> *Parent 26: "I really want it to continue throughout the year. At the beginning of this year, my daughter and I made a list of places to visit. Places visited under this Program were also on our list, and there were even more. This work seems like a miracle to us. I think it supports his development, and he asked us for a telescope as a gift on his birthday. We were very surprised."*

> *Parent 4: "(The Program) It should continue until the year ends. I think this training is very useful. I would love for my child to be interested in science. I think this training is the first step for him. So we did things with our child that we never thought we would do because of the busy schedule. We spent time with him. My son learned new things, and I think it was very effective."*

Discussion

As a result of the research, it was determined that all parents were interested in science, and they tried to answer the child's questions about science clearly and understandably. The answers to the questions that were unknown by some parents were investigated together with children, the answer to the child's question was tried to be explained with examples and practices, and the child was encouraged to ask more questions. Accordingly, it can be said that parents find it essential to encounter science-related issues at an early age and have a positive approach to encouraging the child to learn. Kıldan and Pektaş (2009) determined that preschool teachers think parents are essential in encouraging the child's curiosity about science-related issues. Parents play a critical role in their children's observation, discovery and research of the world they live in (Zucker et al., 2021, p.3). However, the enthusiasm and courage of the parents can ignite the child's interest in science

(Paulu & Martin, 1992). Aktamis et al. (2008) concluded in their research that parents' interest in science helps children grasp the importance of science in daily life.

It has been determined that many parents do various science activities with their children at home; however, a few cannot do such activities due to a lack of time and not knowing what to do. Some parents stated that they only did science activities within the scope of the Program's activities about parent involvement at home with the child. Accordingly, it can be said that some situations prevent the realization of parent-child interaction in science, and the Program plays a mediating role in performing science activities at home. In the research conducted by Erkan et al. (2016), it was determined that reasons such as lack of time, intensity of working life, intensity of housework, lack of pedagogical knowledge are the factors that prevent home-based parent involvement of parents whose children attend early childhood education institutions. Directing parents to parent involvement activities, the teacher's guide for parents, and planning home-based participation are also important parts of the education process. According to Mumpini et al.'s (2021) research, parents already have a proper understanding of early childhood science learning and can theoretically support the child.

Most parents stated that they visited OSLE with the child. The most important of these environments are the zoo, greenhouse/botanical garden and aquarium. Some parents point to busy work life as why these environments cannot be visited. Science and technology museums, anatomy museums, history museums, science centers, science camps, planetariums, aquariums, national parks, zoos, botanical gardens, school gardens, farms, nature centers (lake, river etc.), industrial establishments, hospitals, post offices, digital environments, cinema and theatres, historical open areas, libraries, educational environments of non-governmental organizations, camps conducted within a specific program are OSLE (Cabello & Ferk Savec, 2018; Çolakoğlu, 2019; Eshach, 2007; Laçin-Şimşek, 2020; Republic of Türkiye Ministry of National Education, 2019; Walsh & Straits, 2014). Although it is pleasing for parents to visit these environments with their children, it is seen that one of the reasons for not being able to participate in science activities at home is the intense work life and, accordingly, not being able to spare time. However, it is a fact that parents' good planning of the balance and time management between their work lives and the needs of their children plays an essential role in the child's development.

Parents explained the contribution of OSLE for children, mostly through the zoo and aquarium, and stated that OSLE arouse children's curiosity and lead them to explore. In the research of İnce and Akcanca (2021), parents stated that using OSLE in early childhood education provides many advantages for children's cognitive, affective, social and life skills. Ramey-

Gassert (1997) states that environments such as science centers, museums, and zoos provide motivational, engaging, enjoyable, and non-threatening, hands-on opportunities.

According to the parents, the Program's activities in OSLE contribute various contributions to children in terms of the learning process, development of science process skills, and science learning and development. At this point, we would like to mention the importance of the planning and implementation process, one of the most critical dimensions of the activities to be carried out in OSLE with preschool children. It can be predicted that taking children out of school will raise parents' concerns. İnce and Akcanca (2021) determined that parents whose children continue early childhood education experience various concerns about possible accidents and hazards in out-of-school activities, high-class size, the structure of the OSLE and how to meet the needs of the child. Uludağ (2021) determined that preschool teachers face parent-based problems such as concerns about their children's safety and health problems, negative attitudes towards their children's participation in activities, finding these activities unnecessary, and not wanting to pay transportation and entrance fees. Fear and anxiety about out-of-school activities are essential obstacles to realising these activities (Dillon et al., 2006). However, a good planning process and appropriate practices in this direction will reduce parents' anxiety and ensure active use of the environment. As a matter of fact, in the current research, parents were the supporters of the process and stated the contribution of the activities.

It is obvious that the use of OSLE in science education in early childhood is related to the perspectives of teachers and parents in these environments. Teachers may be shy about carrying out activities in these environments due to environmental opportunities, security problems, parental problems and problems related to themselves (lack of knowledge and experience, etc.) (Uludağ, 2021). However, it is known that parents do not prefer these environments for reasons such as costly use and security problems (İnce & Akcanca, 2021; Uludağ, 2017). Each preschool setting will have its unique possibilities and constraints for using science as a context for early childhood learning. However, small actions by both preschool teachers and parents can make a big difference in highlighting the joy and curiosity of science (Raven & Wenner, 2022).

Parents stated that the Program's activities parent involvement at home contribute to the child and themselves. Parents are an indispensable part of early childhood education. However, parent involvement in early childhood education is an important opportunity for children to learn. Powell et al. (2010) found that parent involvement in early childhood education contributes to children's academic, cognitive and social development. In addition, parent involvement is also effective in developing children's self-esteem and self-efficacy skills (Graham & Kankpi, 2020; Mishra, 2012).

Parent involvement in science education positively affects children's science achievement and attitudes towards science (Fleer & Rillero, 1999; Reinhart et al., 2016). According to Güler and Hazır Bıkmaz (2002), preschool teachers think that cooperation with the family is essential for effective science education and that the child should be given some responsibilities at home. In line with this finding, it is seen that the Program is a science program that contributes to both children and parents with the dimension of parent involvement at home. It is known that many science programs/projects are implemented in various countries related to science education in early childhood and parent involvement plays an essential role in them. Preschool Pathways to Science, ScienceStart! are among these programs. Kefi (2020) states that parent involvement is one of the most important strategies of early childhood science education programs. Therefore, it is clear that the Program's parent involvement activities at home play an essential role in the success of the Program. However, it can be said that parents' interest in science is also effective in the success of the Program. Sahin-Cakır and Uludag (2022) determined that parents' perceptions about science and participation in science activities in early childhood were positive.

According to the parents, the program as a whole contributed to the child's science learning, the development of the learning process, and science process skills. It is known that OSLE has many benefits for K-12 children (Anderson et al., 2000; Armağan, 2015; Attisano, 2021; Balçın & Yavuz-Topaloğlu, 2019; Bamberger & Tal, 2008; Bozdoğan & Kavcı, 2016; Dağal & Bayındır, 2016; DeMarie, 2001; Dohn, 2011; Erten & Taşçi, 2016; Erentay, 2013; Gerber et al., 2001; Hoisington et al., 2010; Li, 2022; Neill, 2008; Sobel et al., 2022; Okur-Berberoglu et. al., 2013; Toprakkaya, 2016; Uludağ & Erkan, in press; Ürey & Çepni, 2014). Civelek and Özyılmaz-Akamca (2018) determined that preschool education supported with outdoor activities improves the science process skills of preschool children and that children find the activities enjoyable. However, the Program, which is a seven-week program, has been a program with its content that all the parents demanded to be implemented for an academic year. The reason for this request was explained as the Program being enjoyable/instructive, effective/successful, beneficial/useful, entertaining/enjoyable, engaging, different, enabling parent involvement, supporting the child's development and being loved and desired by children to continue. Accordingly, it is possible to say that the Program serves its purpose.

Conclusion and Recommendations

According to the research results, parents are interested in science and try to answer their child's questions about science clearly and understandably. They usually spare time for science activities with children at home and visit

various OSLE with children. It has been determined that these environments arouse curiosity in children and lead them to explore. The Program's activities carried out in OSLE contribute to children's learning process, science process skills, science learning and development, and the Program's parent involvement studies have various contributions for both children and parents, the Program generally contributes to children in terms of science learning, learning process and science process skills. In addition, due to its many positive features, parents wanted the Program to be applied throughout the entire academic year.

Early childhood science education is essential for children to know and understand the world, develop science process skills, and form the basis of further science learning. Considering that young children need concrete materials, effective learning environments and real hands-on experiences for learning, the active use of OSLE also gains importance. To achieve science acquisitions in early childhood education, activities in OSLE, which are suitable for learning science and performing science activities, should also be included as classroom activities. Based on this result, we suggest that the use of this and similar content science programs should be widespread and that the active use of OSLE should be included in early childhood education policies. We also suggest making cooperation to benefit from OSLE with systematic and planned practices in early childhood science education to support parent involvement in early childhood science education.

Limitations

The research has a limitation. The analysis is based on the experiences of parents whose children participated in the Program and who are also a part of parent involvement and their observations of changes/development in their child. In future studies, studies can be conducted to determine the contribution of this Program to science learning in later years (for example, primary school). It is possible to research with larger working groups. Mixed method studies can be designed to compare results. Parents' views could be addressed in terms of various variables, but these were not the aim of this research. This research aimed to reveal the effects of a program based on using OSLE in science education with parents' evaluations. All the results are considered an opportunity to construct subsequent relevant research on the importance of using OSLE in early childhood science education.

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