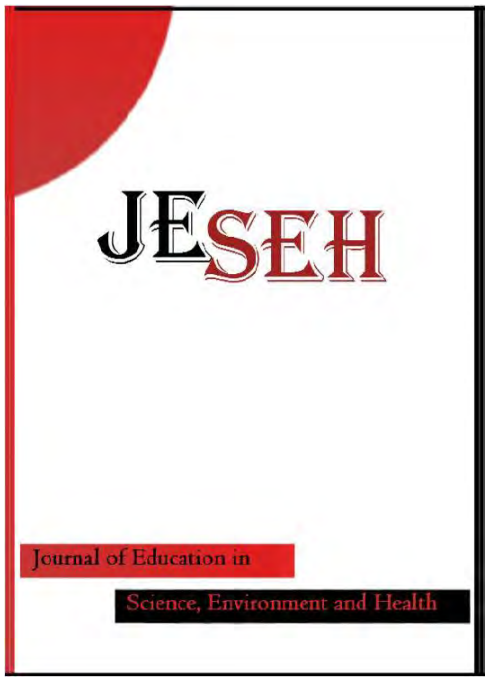

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Abstract

The purpose of this study is to determine the perceptions of preschool children on environmental pollution. A qualitative research method was employed in the current research. The data of the study were collected by semi-structured interview and drawing techniques and the obtained data were analyzed with a descriptive analysis method. The sample consisted of 67 children between 3 and 6 years of age, attending the kindergarten of different schools located in Giresun city center. It was observed that the 3-year-old group emphasized germs and 4 and 6-year old groups emphasized air and sea pollution. When asked about the prevention of environmental pollution, the younger age groups generally stated as "we should throw the garbage into the trashcan", and the group of 6-year-olds stated as "we should not cut the trees". In terms of information sources, the 3-year-old group usually stated their mother, while the groups of 4, 5, and 6-year-olds stated both their mothers and fathers. The children had difficulty in expressing the factors that cause air pollution verbally in the interviews, but in their drawings, they were able to reveal their air pollution perceptions more easily and concretely.

Introduction

It is a fact that environmental problems have increased in recent years and became an important problem worldwide. One of the crucial factors that have an impact on environmental pollution is human beings. It is thought that individuals' awareness of the environment and conscious behavior against environmental problems is the most important step in preventing environmental pollution. To prevent environmental pollution individuals must know throwing trash into such an environment (sea, soil, etc.) is wrong, they must be able to warn others to not use environmental polluters or not to purchase those. For preventing or reducing industrial air pollution, ensuring social awareness is important. To leave a healthier and safer environment for future generations; to prevent the factors that cause environmental pollution, all people, especially students, should be made aware of these issues (Uyanık, 2017).

One of these environmental problems threatening the world is environmental pollution. Environmental pollution, "Is the event of intense mixing of foreign substances with air, water, and soil that adversely affects the health of all living things, that cause material damage on inanimate environmental assets and spoils their qualities." (Çepel, 2003). On the other hand, the use of fossil fuels (coal and crude oil), together with toxic gas emissions into the atmosphere has played a negative role in the increase of the Earth's temperatures (Broadstock et al., 2018). Hence, it is necessary to reduce toxic emissions and leave fuels like coal behind and start using renewable energies (Carvalho et al., 2016).

Especially since the second half of the 20th century, the sensitivity is shown towards environmental problems and the approaches to be applied to solve these problems have gained increasing importance (Kışoğlu et al., 2010). Today, countries allocate budget to solve these problems to cope with the changing environmental conditions and environmental problems. But this solution is the easiest way; raising environmentally conscious individuals. Environmental education plays a vital role in achieving this responsibility (Erol & Gezer, 2006).

The attitudes and behaviors acquired in pre-school education at an early age turn into a permanent identity structure when set as a model. Learning these conversations enables them to develop environmental awareness and a positive lookout towards the future environment (Koçak et al., 2018). A systematic environmental education given starting from the pre-school period is highly effective in gaining a response from the environment and developing positive behavior and attitude towards the environment (Basile, 2000). In this context, environmental education, given starting with the pre-school period, aims to increase the awareness of individuals about the environment and environmental problems.

It is a known fact that preschool children are prone to examine the novelties around them and try to understand the physical world with their natural sense of curiosity and interest. (Mantzicopoulos et al., 2008). A growing literature shows that active care for the environment in adulthood is frequently associated with positive experiences of nature in childhood or adolescence, along with childhood role models who gave the natural world appreciative attention (Chawla, 2007). Preschool children are curious, investigative, and they have strong imaginations and questioning personalities. To support their development, they should be given opportunities so, they can investigate, and satisfy their curiosity, see the cause, and effect relationships, and make various predictions (Arnas, 2002). Their educational environments should be prepared in this direction as well. The introduction of science at an early age allows children to develop insights regarding natural phenomena and to experience basic scientific processing skills, such as observing data, collecting and recording data, making syllogisms, and doing research (Saçkes et al., 2011). For this, it can be said that implementing well-prepared environmental education programs from an early age is important.

The international field of research on environmental and sustainability education is defined in several research overviews (e.g. Reid & Scott 2006). This field of research has its roots going back more than 30 years, to the Tbilisi Declaration in 1977. (Scott, 2009; as cited in, Ärlemalm-Hagsér & Sandberg (2011). From the early 70's, the world's leading leaders in politics, education, and science began to recognize the increasing environmental pollution and its consequences. The International Environmental Education Program – IEEP, in collaboration with UNESCO and the United Nations Environmental Program - UNEP, was launched in 1975. Following the conferences and seminars organized by IEEP, the Intergovernmental Conference on Environmental Education, the first of its kind in the world, gathered in Tbilisi in 1977 with the cooperation of UNESCO and UNEP. The declaration and recommendations of the Tbilisi Conference constitute a turning point for environmental education. Thanks to the conference, environmental education has a place in international education. Education programs currently in curriculum around the world using these programs:

(Classified, general)
• Conscious: To raise the awareness of individuals and societies, all environments, and sections;
• Knowledge: To ensure that individuals and societies have basic knowledge and experience about the environment and issues;
• Attitude: To ensure that individuals and societies gain certain value judgments and sensitivity for the environment, and the desire to participate actively in environmental protection and improvement activities;
• Skills: To enable individuals and communities to gain skills to identify and analyze major systems;
• Participation: To ensure the active participation of individuals and societies at all levels in solving environmental problems (Hungerford et al., 1980:42).

The concept of environmental education in preschool period was first used by Jaus in 1982 (Russo, 2001). Environmental education might be defined as educational efforts exerted to improve individuals' knowledge and awareness of the environment they live in (Gülay & Önder, 2011). Dinçer (2005) emphasizes that the environment is a natural classroom that supports children's cognitive, physical, and social development with rich stimuli. In many studies, the importance of preschool education in the development of children's positive attitudes towards the environment and the importance of environmental education in creating a positive outlook towards the environment is emphasized (Domka, 2004). According to the booklet titled "The Turkish Ministry of National Education, Early Childhood Education Curriculum" (MONE, 2006), prepared by the Directorate General of Preschool Education, meticulously planned educational environments, and is of great importance for the implementation of preschool education programs. According to the booklet, well-planned educational environments should have the following characteristics: (1) They should be relevant to children's developmental characteristics, (2) be safe, (3) be multi-purpose, (4) improve problem-solving skills, and (5) support creativity (Gezgin, 2009).

Children learn by creating and living with science studies in preschool education. Science studies allow children to recognize their environment, conduct experiments and discuss the same, develop manual skills, learn about scientific methods such as observing, testing, and measuring their ideas, and actively participate in the research process. Active learning by these will make the information children receive more permanent. Besides, children can transfer this information to other areas they study (Poyraz & Dere, 2001).

Preschool education is a period in which scientific skills and basic science concepts that a child may need throughout his life are developed. In this period, it is important to teach these subjects to children, similar to how science activities are conducted, and note the problems faced by teachers (Karamustafaoğlu & Kandaz, 2006). Experiencing, exploring, and learning about nature and its diversity is in the framework plan, and is seen as important aspects in developing respect for nature, encouraging environmental awareness, and contributing to

sustainable development. The kindergarten staff is expected to use nature as an arena for play and learning and together with children and reflect on natural phenomena as well as workings of nature (Skarstein & Skarstein, 2020).

The researches indicate that people who cared about plants and animals in their childhood and who have had childhood experiences in nature are more sensitive to environmental problems in their future lives than those who do not perform these behaviors in their childhood (Erten, 2004). To maximize the natural potential of a human being, it is necessary to offer him/her various opportunities at an early age. Therefore, education is given to children at an early age and the role of the physical and social environment of the children is especially important in terms of their development (Oktay, 1999).

It is revealed in various studies that children who learn about their environment and who are sensitive to their environment in the early years of life maintain their attitudes in the later years as well (Robertson, 2008; Orr, 2002). Considering that it is required that children recognize the fact that we are part of nature and they should not harm the living spaces of other living beings and they should be environmentally sensitive and at peace with nature, it will be possible by developing awareness and perception regarding environmental pollution at a young age. In this context, it is important to reveal the perceptions and information sources of the preschool children towards environmental pollution to prepare the educational environment. As a result of the literature review, on the other hand, finding out a study examining the pictures of preschool children regarding environmental problems (Özkul, 2018) indicates that even though environmental education for children in the preschool period has been increased in recent years in Turkey, the desired level is not yet reached. Our study, unlike previous research, is aimed to investigate the perception of environmental pollution as well as information sources. Data collection is conducted with both interview and picture analysis to increase the specificity of the research.

It is a well-accepted fact that children's attitudes and habits concerning the environment are shaped in early ages (Poyraz & Dere, 2001; Aral et al., 2001; Kınık et al., 2016). Attitudes and behaviors towards the environment and nature are acquired in this critical period, affect other steps of life, and become more inflexible in future ages (Palmer, 1995; Horwitz, 1996; Smith, 2001; Domka, 2004; Taşkın & Şahin, 2008). In the related literature, Yağcı (2016) highlights that nature - and environment-related activities are influential on the development of preschool children's scientific process skills, and Uslucan (2016) reports that preschool children's attitudes towards the environment are changed for the better with the implemented environmental education program. Besides, it is possible to think that environmental education given to children at an early age is influential in the prevention of environmental pollution as it increases environmental awareness. In Turkey, this may be possible by giving more coverage to subjects associated with environmental education in preschool education curriculum, expanding subjects, and including projects regarding environmental education or pollution, thereby enhancing environmental perception.

Initial research on the concept of the environment generally focused on the perception of this concept and environmental attitude (Payne, 1998; Rickinson, 2001; Abd El-Salam, et al. 2009; Alp et al. 2006; Aminrand, et al. 2010; Anderson, et al. 2007; Astalin, 2011; Chapman & Sharma, 2001; Harun, Hock, & Othman, 2011; Huang, & Yore, 2005; De la Vega, 2006; Makki et al., 2003; Olufemi, 2012; Özsoy & Ahi, 2014; Loughland et al., 2002; Uyanık, 2017; Olufemi et al., 2017; Saz et al., 2020; Gädicke et al., 2017; Doğan & Simsar, 2019; Aznar-Díaz et al., 2019). Looking at other studies in the literature, The effect of culture on environmental perspective (Liu & Lin, 2014), cognitive perceptions of pre-service science teachers for environmental pollution (Kalaycı, 2020) and children's thoughts on environmental problems (Boyes & Stanisstreet, 1994, 1997, 1998; Jeffries et al., 2001), studies have been found. However, looking at previous studies, it is seen that there is little work done in the preschool period on environmental pollution. In their few studies, it was observed that they use drawings to collect data. Unlike these studies, this study aimed to provide more in-depth information about environmental pollution in the preschool period by collecting data with both drawings and interviews. On the other hand, there is no study on information sources on preschool writing environmental pollution. The purpose of this study is to determine the perceptions of preschool children on environmental pollution. In line with this purpose, this study, it was aimed to reveal what the environmental pollution perception is, whether this perception differs according to age (3, 4, 5, and 6 years) and what the sources of this perception are.

Therefore, in this study, it has been tried to determine the sources of information by focusing on whether children's perceptions of environmental pollution differ according to their age levels during the preschool period. Determining whether perceptions differ will contribute to the literature by providing an insight into the content of environmental education that is to be provided based on age levels. In line with these objectives, the attention of the researchers can be drawn to environmental education in early childhood, and the results obtained from the study are valuable since it can guide future studies about environmental perceptions perceived by

children and sources of information. Also, it is considered to be a model in determining the thoughts on the environmental pollution of students that are in primary schools within Turkey.

Method

Research Design

The purpose of this study is to determine the perceptions of preschool children on environmental pollution. To this end, the preschool children were requested to make drawings that could reveal their perceptions of environmental pollution instead of employing just one source of information (interview). In this regard, the study employed the case study design, which is a qualitative research design, to study and describe the existing situation in-depth. According to Creswell (2007), the case study is a qualitative research approach in which the researcher explores in-depth one or several situations limited in time by using data collection tools including multiple sources (observations, interviews, visuals-audios, documents, reports) and describes situations and themes based on situations. Student drawings, one of the qualitative data collection techniques, have been quite popular with the studies in science education since 2000 (Patrick & Tunnicliffe, 2010).

The most basic feature in the case study pattern in qualitative researches is the in-depth investigation of one or more subjects. Factors related to a situation (individuals, environment, process, etc.) are investigated through a holistic approach and focused on how they affect the situation or how they are affected by the situation. It is not possible to generalize the results as the cases to be researched in qualitative case studies are different from each other. The results obtained regarding a situation constitute examples of similar situations (Yıldırım & Şimşek, 2011).

Study Group

The sample consisted of 67 children between 3 and 6 years of age, attending the kindergarten of different schools located in Giresun in the 2016-2017 Academic Year. Appropriate sampling and purposeful sampling method were used to determine the sample. The children "who participated "in the study were determined by using a convenience sampling method, primarily from each age group. Sample children, usually live in a small developing city by the sea and in the city center or neighborhoods close to the city center, where traffic is not heavy, greenery is abundant and industrial facilities are generally outside of residential areas, with a medium economic class and small nuclear families. The characteristics of the sample are given in Table 1. In our province, there is no intense noise pollution since industrial facilities are located outside of residential areas. The most important cause of air pollution in the province, especially in winter, is the polluting elements originating from heating and the polluting elements from vehicles (ÇED Report, 2018). According to the report, it is stated that soil and water pollution is minimal, there is no noise pollution, and air pollution occurs in winter.

Table 1**.** Characteristics of the sample

Age	Gender	n
Age 3	Female	9
	Male	10
	Total	19
Age 4	Female	7
	Male	6
	Total	13
Age 5	Female	15
	Male	8
	Total	23
Age 6	Female	4
	Male	8
	Total	12

Data Collection Tool

The research data were collected from the children through drawings and semi-structured interviews. Drawings are important tools for preschool children to reflect on their inner world and for obtaining information about

such a world as these children cannot express themselves verbally (Halmatov, 2017). To children, drawing pictures is one of the reliable and valid projective techniques. Small children in particular have a smaller vocabulary (Ryan Wenger, 2001). However, children can express themselves more easily and with words through pictures than words (Skybo et al., 2007). Previous research (Barraza, 1999; Dove et al., 1999) indicates that it is both easy and informative that children express their emotions by drawing pictures during scientific research, and children establish easy communication with the researcher without feeling any pressure. Drawing has been used in research with enthusiasm for 50 years (Mosseley et al., 2010). In the present study, the students were requested to draw a picture of environmental pollution to reveal their perceptions of environmental pollution. Such drawings were scanned and saved in the computer environment.

Having children draw pictures is one of the valid and trusted projective techniques. Small children, especially, have limited vocabulary (Ryan Wenger, 2001) and can withdraw themselves during a conversation. The children can express themselves by paintings easier, and in a more fun way compared to words (Aral & Metin, 2012; Skybo, 2007). To obtain children's opinions, 4 open-ended questions were created, and the interview form was drawn up by the researcher. The first question was "What do you understand from the word environment?" and it was asked for examining the environmental perception in the general sense, and then 4 questions were asked in total which are "What is environmental pollution?", "How is environmental pollution occur?", "What can be done to reduce environmental pollution?", and "Where did you learn those?". The data of the study were collected by using a semi-structured interview regarding "environmental pollution" and the obtained data were analyzed. The opinions of a field specialist and a science education specialist were taken about the validity of the open-ended interview form. In terms of the credibility of the research, interviews were conducted after ensuring that children could not hear each other.

Procedures

In the data collection process, the children were firstly requested to draw pictures about environmental pollution. The researchers entered the classes with the teachers and met with the children, and after greeting them, they said that they would interview the children one by one. In the drawing process, it was ensured that the children made individual drawings at separate times so that they would not be affected by each other. What they would do was explained to them, and they were asked whether they wanted to go to the desk that had been prepared for the study in advance. A4 papers, crayons, and color pencils allowing them to use any color were put on the desks beforehand.

The question "Would you like to draw a picture of environmental pollution?" was addressed to the children. The drawing was not started until it was ensured that each child understood it. Then the children were requested to draw by choosing the crayons and colored pencils they wanted. An attempt was made to assure that the children did not interact with each other during drawing. No intervention was made, and no time limitation was applied when the children were drawing. When a child said that s/he had completed his/her drawing, the question "Could you explain your picture to me?" was addressed to him/her. The children's comments on their drawings were written on a separate paper. The figures they drew were asked one by one, and what they drew was noted. Then the pictures were interpreted and analyzed. The pictures they draw were used to support their interviews. Interview questions were asked at the end of the drawing process. Children were interviewed individually, and their answers were recorded in writing. Also, demographic information of children was obtained from the children's files through their teachers and recorded in the demographic information form.

Researcher's Role

In qualitative research, a researcher is a person who spends time in the field, knows it well, interacts with the individuals in the field, and may affect the research result with his/her interpretation. Hence, s/he should explain his/her role in the study (Yıldırım & Şimşek, 2008). The researcher of the present study has a Ph.D. in science education. Her research interests include scientific process skills, teaching science and environment concepts, inquiry-based teaching, learning-teaching processes, and critical thinking. She actively participated in planning the research, developing data collection tools, analyzing the data, and writing the research report. In qualitative research, the researcher closely monitors events or phenomena with a participatory attitude. On the other hand, the researchers' observation and literature knowledge were used only in the data interpretation stage (Miles & Huberman, 1994).

Data Analysis

The qualitative content analysis method was used as a data analysis method. According to Cohen et al. (2004), content analysis is also defined as the process of summarizing and specifying the basic contents of the written information and the messages they contain. In this research, thematic analysis, among the content analysis methods, was used. The thematic analysis involves the stages of creating a thematic framework, analyzing data based on this framework, and interpreting the findings. Within the framework of the thematic analysis, the data obtained are described, and the data described are interpreted. The results obtained are interpreted by the researcher looking for a cause-effect relationship (Yıldırım & Şimşek, 2006). The interviews were transcribed, and the frequency values were calculated and they were given under the findings section by indicating the different age groups (in the form of C 3, C 4, C 5, and C 6). Also, the children were asked to draw pictures to support the interview questions regarding their perceptions of environmental pollution. Furthermore, the drawings are an alternative way for us to understand them for the children who cannot express themselves verbally (Rennie & Jarvis, 1995). To this end, the draw-and-tell technique has been used (Shepardson, 2005). This technique includes the drawings of students and explanations of these drawings. The draw-and-tell technique is a diagnostic method used to understand how children construct thoughts and concepts (McWhirter et al., 2000). In practice, children were asked to draw a picture of environmental pollution and explain their drawings. The drawings of the students were interpreted and supported with their opinions regarding the concepts.

Ethics in Research

Considering the ethical issues, the required verbal permissions were obtained from the school principals and it was promised that the results of the study would not be used in a situation that would violate research ethics. Voluntary participation was provided by asking the children whether they wanted to engage in interviews and drawings. The interviews and drawings were conducted in the children's classes in their schools. While these children were attending the interviews and drawings, other children continued their activities under the supervision of preschool teachers. The students completing the interviews and drawings returned to the activities conducted by their teachers again. It was stated that the research data would only be read and evaluated by the researchers, and the participants' real names and identities would be kept confidential. The teacher was informed about the ethical principles adopted in the study. Furthermore, code names were used for each student (e.g. Ayşe, Ali) per ethical principles.

Validity and Reliability

To ensure validity and reliability, the study employed qualitative data triangulation, which refers to using multiple data for helping to understand a phenomenon, and analyzer triangulation, which is defined as the analysis of the same qualitative data by two or more people (Jhonson & Christensen, 2014; Patton, 2014). In this regard, the data in written reports were separately coded by two independent coders (one coder was one of the researchers, and the other was a researcher in the same field) to determine the relevance of the codes arranged under categories. The reliability of the data analysis made in this way was calculated by using the formula [Agreements / (Agreements + Disagreements) x 100] (Miles & Huberman, 2015). Average intercoder reliability was found to be 88%.

The Validity and Reliability of the Study

To ensure the credibility of the study, the obtained results were compared by experts, and expert opinions were used in the research process. The themes coming out of the raw data were presented with directly quoted participants' views to assure transferability. For confirmability, the interview notes and drawings were saved in the first place. To provide consistency, the themes were reviewed by an external expert who criticized and provided feedbacks in the entire process from constructing the research problem to preparing the research report. Separate researchers examined all such documents.

FINDINGS

In this section, the findings are presented according to the themes.

The meaning of the concept of environment

As a result of the analysis of the data obtained from the study, a total of 5 themes (Environment, Animal, Human, Buildings/Vehicles, Abiotic Elements) were obtained. It is observed that the children in the 3, 4, and 5-year-old groups stated a clean environment (f=6) under the theme of the environment, whereas 6-year-old groups (f=1) stated a dirty environment. In their interviews, children talked about people, various plants and animals, structures such as houses and factories, the sun, forest, cloud, sea, sky, nature, and natural events, elements such as air and smoke. The most commonly used among these elements is the flower (f=8) and tree (f=8). Under the theme of Human, the 3-year-old group mostly stated family (f=2), 4-year-old group (f=1), and 6-year-old group (f=1) stated people as of damaging nature. Under the theme of buildings/vehicles, it is seen that the 3-year-old group (f=3) indicated a car, park, and house, while the 6-year-old group (f=1) indicated a factory. Under the abiotic theme, it was observed that they were mostly stating sea (f=5).

Examining the perception of the environment in terms of age groups; while 3-year-old age group answered for the term "environment" as rain, sun, and mother, father, sibling, it is observed that 4-year-old age group answered it as sea, sun, cloud, and animals, 5-year-old age group answered it as tree, flower, animals and keeping the environment clean, and the 6-year-olds answered it as polluted environment, forest, tree flowers and sea, and smoke. It can be said that the perception of the polluted environment in the age groups of 3, 4, and 5 is not yet developed and that 6-year-olds have a perception of a "polluted environment". The items frequently mentioned in the interviews with the children are given in Table 2.

Table 2. Frequency table about the meaning of the concept of environment

Themes	*Sub-themes*	*Age 3* (f)	*Age 4* (f)	*Age 5* (f)	*Age 6* (f)
Stated	Dirty				1
	Clean	1	1	4	
Plant	Flower	1	1	3	3
	Tree			5	3
	Grass				1
Animal	Caterpillar, Dog, etc.		2	3	
Human	Human			1	
	Family	2			
	Pit boiler people		1		
	Woodcutting people				1
Building/tools	Factory				
	Car	1			1
	Home	1			
	Park	1			
Abiotic items	Sun	2	3		
	Forest			1	3
	Cloud		2		
	Sea	1	3		2
	Sky		1		
	Nature and nature events	3		1	1
	Air				
	Smoke				1
					1
No information	No information	4		5	

When we take a look at the answers of the children, it is seen that they give the following answers:

C 3: Chips were thrown on the ground
C 3: Trash, rain, fire, storm, sun
C 4: The mud pollutes the environment and the smoke coming from the stove at the house pollutes the environment
C 4: Sea rabbits birds butterflies
C 5: Not polluting the environment
C 5: Many animals or trees in our world
C 6: I understand like forest and city, I think that one of the countries of the world is a forest
C 6: I understand the air. People in the car are coming and they are driving cars.

The occurrence of environmental pollution

In terms of the pollution forming around us, they generally stated as "by throwing garbage on the ground" (f=41) under the theme of behavioral factors, and as for the other factors they stated germs (f=6) in the first rank. Regarding the formation of environmental pollution; while the 3-year-old group responded as "when we throw garbage on the ground and by the germs", it is seen that the 4-year-old group answered as "when we throw garbage on the ground", "from the air" and "by throwing bottles into the sea" the 5-year-old group answered as "when we throw garbage on the ground" and "when we throw fruit/banana skin on the ground and the 6-year-old group responded as "when we throw garbage on the ground" and other than these as "not cutting the trees" and "smoke from the factories". Table 3 shows the answers given for the occurrence of environmental pollution as a frequency table.

Table 3. Frequency table about the occurrence of environmental pollution

Themes	*Sub-themes*	*Age 3* (f)	*Age 4* (f)	*Age 5* (f)	*Age 6* (f)
Behavioral factors	Throwing the trash on the ground	7	7	20	7
	Battery			1	
	Paper		1	1	
	Bottles		2		1
	Banana peel/Ice cream / chips			2	
	Dirty water	1	2		
Other factors	Air		2		1
	Microbe	5		1	
	Smoke		2		
	Coal	1			
	Mud		1		1
No information	No information	3			

When we take a look at the answers of the children, it is seen that they give the following answers:

C 3: When we throw litter and throw the food.
C 3: When we throw the chocolate packages on the ground.
C 4: Smoke comes out of the pipe behind the cars and outside becomes dirty. It gets dirty with the smoke of the garbage truck.
C 4: It is composed of air and because the garbage is thrown into the street.
C 5: If we throw garbage around, our world will be very bad.
C 5: It occurs when the garbage is thrown and when our hands are dirty, and we rub them onto something.
C 6: It is polluted with the factory fumes and they are throwing bottles into the sea
C 6: We can warn people we can tell them about pollution through the writings we can say "boo" to those who pollute the environment.
C 6: We should not cut down the trees.

Reducing environmental pollution

As to how we prevent or reduce environmental pollution, the majority of children stated that "by throwing the garbage in the trash can" (f = 31). While the 3-year-old group answered as "we should throw the garbage in the trashcan or we clean them", it is observed that the 4-year-old group answered as "we should throw the garbage in the trashcan", "we do not throw garbage on the ground", "not throwing bottles into the sea" and 5-year-old group answered as "we should throw garbage in the trashcan and collect all the garbage" and 6-year-old group answered as "we should throw garbage in the trashcan and should not cut the trees". Table 4 shows what needs to be done to reduce environmental pollution as a frequency table.

When we take a look at the answers of the children, it is seen that they give the following answers:

C 3: We do not throw the garbage on the ground and do not throw the sugar bag as well.
C 3: When our environment is dirty, we clean dirty waters.
C 3: We place the soap in our hands, we make it wet and the germs go away.
C 4: The things we throw on the ground will create evil, by throwing them in the trash we can avoid it.
C 4: Construction machinery comes and tidies the roads. Garbage men collect trash

C 4: We spray pleasant odors into the air. We should not pollute our air.
C 5: We have to collect the garbage and throw them in the trashcan.
C 5: When people do not throw garbage
C 5: If we keep our surroundings clean, the animals can play happily.
C 5: Because of toys, messiness, we should not throw the shells on the ground
C 5: We say to them "throw the garbage in the trashcan". We throw the plastic waste into the plastic waste box.
C 6: We should throw the garbage in the bin and we will not draw pictures and use the drawing paper.
C 6: By not throwing the garbage on the ground. By throwing trash into the recycling bin, not cutting down the trees
C 6: If we collect garbage, environmental pollution will be removed. If we collect the garbage, the air will recover, and pollution will decrease.

Table 4. Frequency table for reducing environmental pollution

Themes	Sub-Themes	Age 3 (f)	Age 4 (f)	Age 5 (f)	Age 6 (f)
Cleaning the garbage	Throwing garbage in trash/ trolley /container	8	6	9	8
	Clearing	5	1	7	2
Air cleaning	Filter	1			
	Squeezing nice smells into the air		1		
Sea cleaning	Not throwing bottles		2		
Nature protection	Not cutting a tree				2
	Stop smoking		1		
	Protect			1	
Personal hygiene	Washing hands	1		1	

Source of information on environmental pollution

When the sources of information on environmental pollution are examined, it is seen that the children are usually stated their mothers (f = 16). While the 3-year-old group usually answered as a mother, it is seen that 4-year-old group answered as mother and father (f=5) 5-year-old group answered as mother-father, sister and brother (f=3) 6-year-old group answered as mother-father (f=3) in addition to tablet/computer (f=1). Table 5 shows the frequencies of environmental pollution information sources.

Table 5. Frequency table of information source about environmental pollution

Themes	Sub-themes	Age 3 (f)	Age 4 (f)	Age 5 (f)	Age 6 (f)
Family	Mom	12		2	2
	Father	3		1	
	Mother father		5	3	3
	Sister / Brother	2		3	
	Grandmother	1			
Environmental	Teacher	1	3	1	2
	School	2		1	1
	Scavenger				1
	Friend		3		1
Digital environment	Television		3	2	2
	Tablet / Computer				1
Self-knowledge	to know / to learn	1	2	1	2

When we take a look at the answers of the children, it is seen that they give the following answers:

C 3: From my mother; my mother always cleans and washes the house, and I clean my room.
C 4: I know it myself and sometimes I saw on TV
C 4: My friend Furkan told me
C 5: I know it because in our new neighborhood there is always garbage
C 5: I learned myself, I watched cartoons
C 6: I learned from my mother and from the garbage man
C 6: I learned it from TV, from computer, from phone

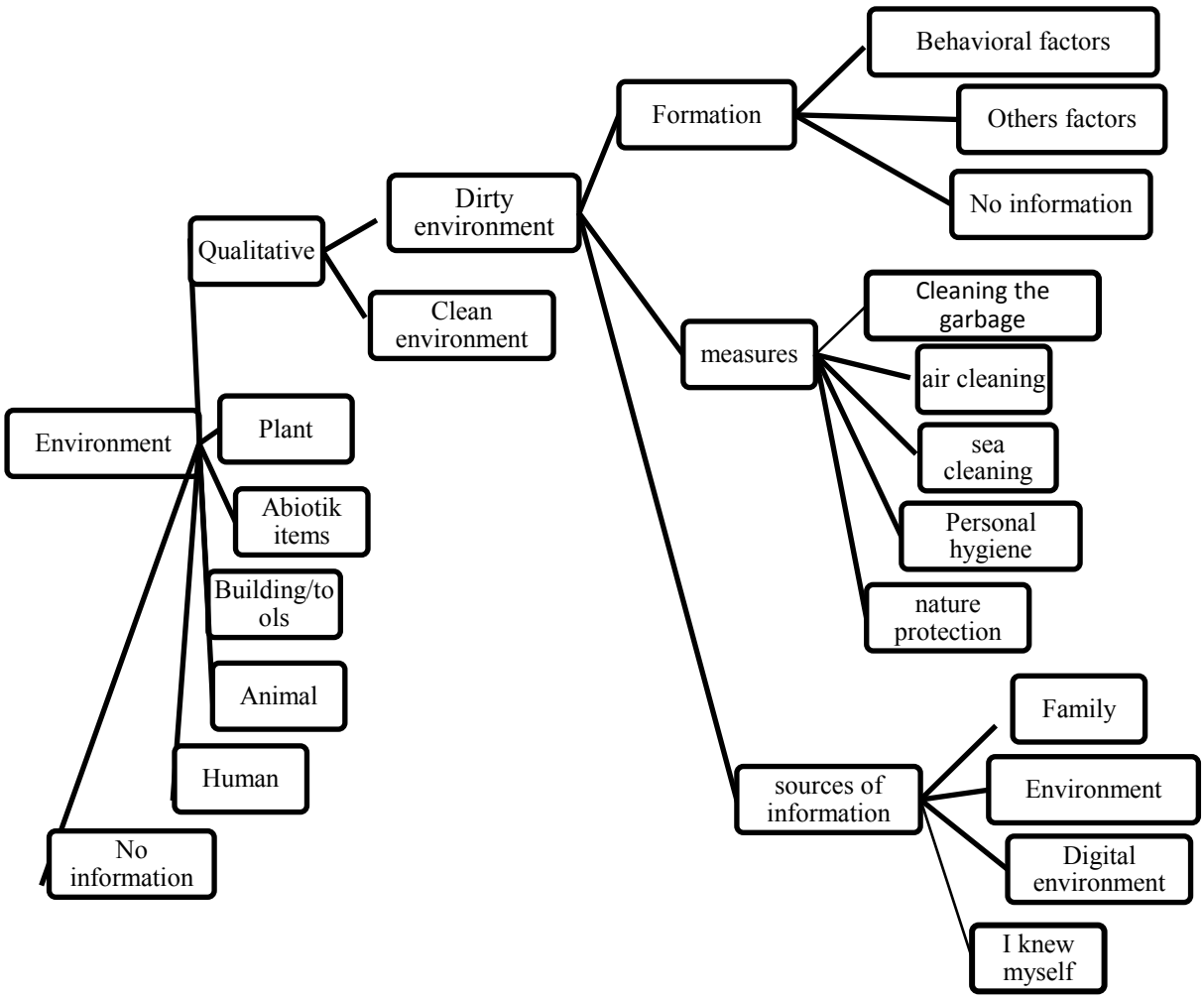


Figure 1. A model with the findings obtained from the study

Findings Related to the Perception of Environmental Pollution

Findings derived from the pictures of 3 to 6-year-olds regarding their environmental pollution perception:

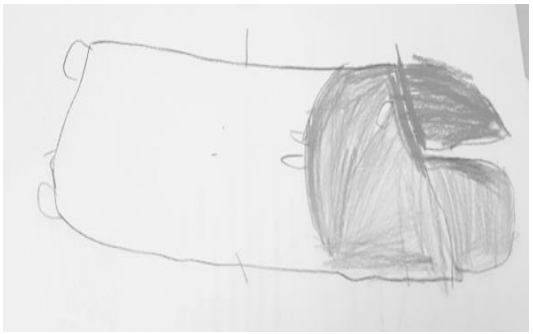
When examining the drawings of the children it is seen that they drew garbage, smoke, and people collecting garbage. When we take a look at the pictures of the children within the 3-year-old age group regarding environmental pollution, it is seen that they primarily drew clean hand and germ, smoke, and cloud pollution. As for the children within the 4-year-old group, they highlighted the types of garbage (paper, beverage, apple litter, etc.), marine pollution, and air pollution in their drawings and they diversely drew recycle bins as well. When the pictures of the children from the 5-year-old group are examined, it is seen that they draw trashcan, garbage truck, garbage collection rocket, and they draw stuff regarding garbage collection. When the pictures of the children from the 6-year-old group are examined, it is seen that they drew garbage truck, garbage men, and also smoke from factories and cutting trees as the causes of pollution, and unlike other age groups, their causes of pollution (smoke from the car or house, the cutting of trees) were diverse.

The use of children's drawings as a systematic measure to evaluate children's perceptions and attitudes towards the environment is still in the process of development. Children's drawings have been used as emotional indicators for specific environmental problems, and to determine the attitudes children have towards different environmental situations (Barraza, 1999). Children were asked what they drew in their pictures and requested to interpret their pictures. Comments of the children regarding their pictures are as follows (Figure 2).

1. Ayşe (3-year-old): Environment is polluted because of dirty water. Cloud is dirty.

2. Ali (3-year-old): I drew a house and smoke coming out of the chimney. I drew a garbage collector robot

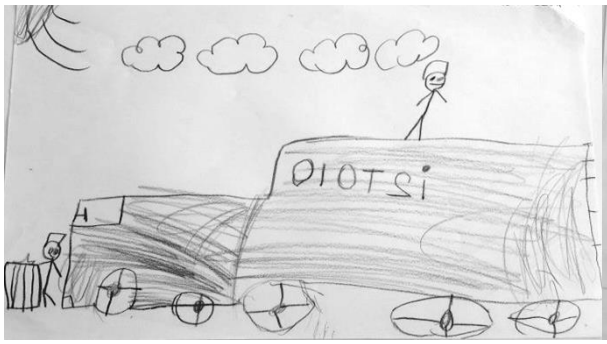
3. Melek (4-year-old): I drew the wind paper and I drew the rain. I drew drinks and apple garbage



4. Sevgi (4-year-old): I drew a big fish in the picture. The head of the fish is dirty because the sea was dirty

5. Büşra (5-year-old): Man throws garbage in the trashcan

6. Ahmet (5-year-old): The garbage truck is cleaning the surroundings. There is a trashcan. There is a parking area under the house.



7. Burak (6-year-old): The garbage man is picking up the trashcan and will be throwing it into the garbage, and he has a helper

8. Müge (6-year-old): Cutting trees is environmental pollution. When hunters cut the trees, it causes environmental pollution. Smoke from cars pollutes the environment. Smoke from the chimney of the houses pollutes our environment

Figure 2: The pictures of 3 to 6-year-old groups regarding their environmental pollution perception

The themes and sub-themes resulting from the analysis of the pictures are shown in Figure 3 as a model.

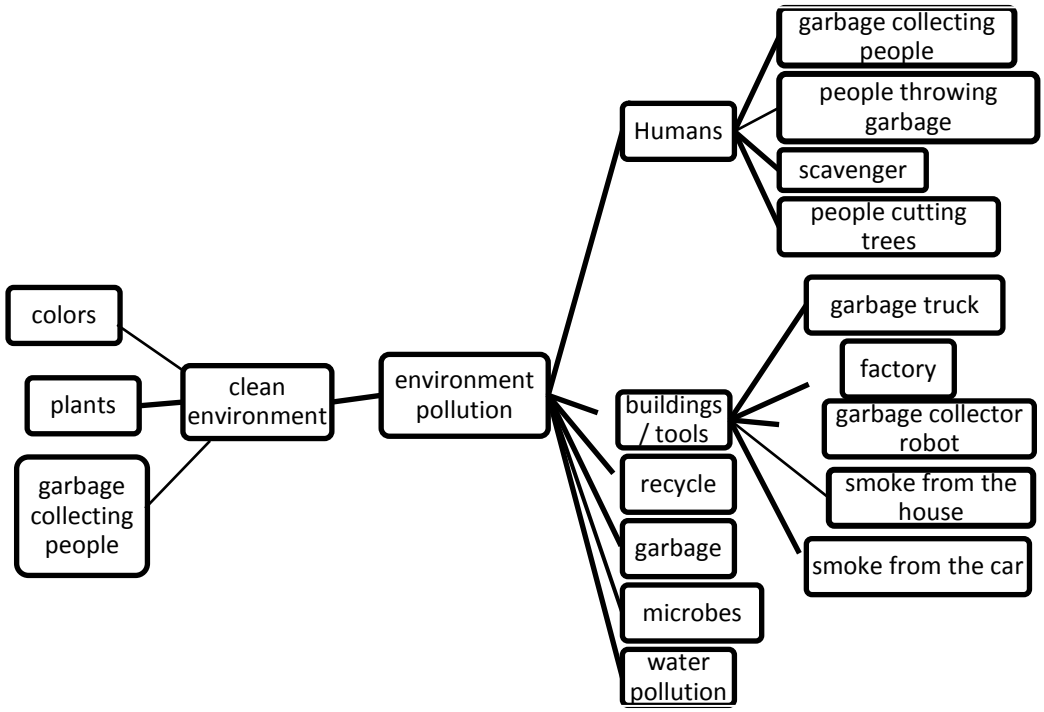


Figure 3. Model created with the findings derived from the drawings

Discussion and Conclusions

According to the results of the interview about environmental perception, it is observed that while the environmental perceptions at 3-4 years of age are rain, sun, cloud, and animals, at 5 to 6 years of age it is changed as keeping the environment clean, smoke out from the factory and cutting the trees. The reason for the change in children's environmental perceptions as they grow can be thought to be the effect of the school. While the environmental perceptions of the children at the ages of 3-4 were about the living and non-living elements they observe in their environment, they were seen to have no perceptions of pollution. Kahraman et al. (2019), states in their study that children's understanding of the environment is limited to which living organisms and tangible objects they explore in their daily lives. Shepardson et al. (2007), analyzed students' cognitive schemas regarding the word "environment" and divided their perceptions into four categories. In the first category, the environment was presented as a place where only plants and animals live. In the second category, the environment was defined as a place where human beings meet their physical needs. In the third category, the environment was seen as a place where human beings interact. In the fourth category, the environment was started as a place where all living beings collectively live in peace. Likewise, Loughland et al. (2002, 2003), discuss that there are six distinct categories in which students perceive the concept of environment, based on the variables mentioned above; these categories are, respectively, the place that includes living organisms; the place that includes living organisms and humans; the place is for humans; humans are part of the environment and are responsible for it; humans and environment are in a mutual relationship and they have an effect on each other. As a result of another study by Shepardson (2005), exploring children's attitudes towards the environment, reports that children perceive the environment as a place where they meet their needs and interact. Children define the environment as the place where they meet their physical needs (eating, drinking water), play games, and spend time with animals. Loughland et al. (2002), argue that children's understanding of the environment in early childhood is that environment is a place; however, after this period, their perception is that environment is a place in which living organisms and nonliving things interact with each other. In this study, it is seen that the environment is perceived as a place where living things live, interact and meet their physical needs, rather than environmental pollution.

On the other hand, in this study, as a striking result, it was observed that while 3-year-old children included mothers, fathers, and siblings in their environmental definitions, children aged 4-5 and 6 did not include their mothers, fathers, and siblings as environmental factors. The reason for this can be said to be that the 3-year-old

family attachment is higher than the other groups. The fact that the children gave examples of environmental pollution at the ages of 5 and 6 shows that the perception of environmental pollution came out at these ages. Although they are in the same development period in terms of age, it is possible to say that they first think more concrete (microbes) about environmental pollution, and they can think in a versatile way as human activity towards the age of 6. One of the common points of all the studies on environmental perception is that the participants associate environment with environmental problems (Barrazza, 1999; Özsoy, 2012; Shepardson et al., 2007; Yardımcı & Bağcı Kılıç, 2010). In terms of studies in primary school, Ertürk, (2017), as a result of the study in which primary school students determined their perceptions of environmental problems and environmental education, students expressed the concept of the environment as a friend, home, oxygen, life, living space, tree, earth, and nature. Students stated that garbage wastes, destruction of trees, soil pollution, garbage disposal in water, disposal of waste batteries, air and sound pollution, forest fires as environmental problems. It is seen that the answers given in 5-6 age groups and in primary school are similar, differently, it is said that waste batteries should be disposed in primary school.

In literature, there are studies showing that the variables affecting the preschool children's understanding of the environment include other factors such as age, gender, socioeconomic status, and the area where they live. Loughland et al. (2002) and Barraza (1999) emphasize that there are a wide variety of variables affecting environmental perception. According to these authors, age and gender are important variables associated with the concept of the environment. This study also indicates, regarding the age groups, that the concept of environment for children at the ages of 5-6 is the environmental pollution and protecting the environment while for the children at the ages of 3-4, this concept is that environment is a place in which living organisms and nonliving things interact with each other.

Same way, in the literature, it is apparent that the environment is perceived as an object or place which living beings inhabit (Barraza, 1999; Shepardson et al., 2007; Yardımcı & Bağcı Kılıç, 2010; Yavetz et al., 2014). Littledyke (2004), expresses that the students at young ages do not hear anything about the concept of environment, and even if it is heard, they don't know what it means and that age is an important variable indirectly perceiving the concept of environment, supporting this result.. On the other hand, according to Basile (2000), the formation of environmental knowledge and attitude towards the environment begins to take shape in the preschool environment. On the other hand, another study reveals that children perceive the concept of environment differently depending on where they live and their socio-economic level (Halmatov et. al.,2012; Taşkın, 2008).

As the factors causing environmental pollution, the children did not specify the smoke coming from the house or the factories that much, but they mostly drew the smoke in their paintings. The participating children had difficulty in verbally expressing the factors causing air pollution, which is a sub-dimension of environmental pollution, during the interviews, but were able to manifest their perceptions of air pollution more easily and concretely through drawings. On the other hand, as a different result, Saz et al. (2020) stated that, as a result of the drawings they made regarding environmental pollution in the age group of 5, they mostly show environmental pollution through plastic, packaging packages, papers, glass waste, metal waste, waste bins, recycling bins, and nutrients. While 1 of the children draws on water pollution; 15 of them made drawings on land pollution. A child deals with both water and land pollution in his painting. Also, for air pollution, no drawings were found. The fact that children see concrete examples in the area they live in and information resources are insufficient could be the reason why perceptions about the type of pollution vary within the same age groups. Likewise, Paraskevopoulos and Zafiropoulos (1998), state that students' understanding of the concepts of environment and the environmental issues is defined by their experiences (facts they face in their lives, for example, regional pollution). Similarly, the environmental perception of children varies according to the areas in which they live (Shepardson, 2005; Paraskevopoulos et al., 1998; Basile, 2000).

When they are asked how environmental pollution is occurring, they usually respond as "when we throw garbage on the ground". In this regard, children between the ages of 3-6 have associated the cause of environmental pollution with the cause of soil pollution. It was observed that the 3-year-old group emphasized germs and 4 and 6-year old groups emphasized air and sea pollution. It can be said that 3-year-olds associated microbes with environmental pollution as they saw them as a general cause of pollution. It was determined that 3-year-olds did not have much knowledge about how environmental pollution occurs, but they indicated a variety of factors causing pollution towards the age of 6. When we look at the results of similar studies conducted at primary school levels, in a study conducted by Yardımcı and Kılıç (2010) with elementary school students, it was observed that students also emphasized the environmental pollution caused by garbage and exhaust gases. On the other hand, in the studies of Demirbaş and Pektaş (2009), where they research the recognition levels of elementary school students of the basic concepts of environmental problems, it is observed

that students often respond accurately in terms of environmental problems encountered within the course of their daily lives, however, wrong answers were given regarding certain subjects which are considered among the current problems but probably not much discussed within the teaching environment, such as the greenhouse effect and global warming, etc. Özdemir Özden and Özden (2015), the purpose of their study is to investigate the perceptions of students in 6th, 7th and 8th grades about environmental problems based on their drawings As a result, the students drew more pictures about local environmental problems than global ones. Among local environmental problems, the students drew pictures of air pollution most.

When asked about the prevention of environmental pollution, the age groups generally stated as "we should throw the garbage into the trashcan", and the group of 6-year-olds diversely stated as "we should not cut the trees" and "we should warn people". 6-year-olds were able to infer that harm to the environment could lead to environmental pollution. The fact that the 3-year-old group stated attaching a filter and the 4-year-old group emphasized sea pollution established a remarkable result. Children at the age of 3 have said that they use a filter and children at the age of 4 have emphasized marine pollution while children at the ages of 5-6 have not mentioned those things. And it points out an interesting conclusion. The underlying reasons for this may be that younger children (i.e., ages of 3-4) have a higher level of awareness and each age group has different information resources. It could be suggested that the higher the age is, the more and detailed information learned from experience one has.

Looking at other studies, in the study conducted by Aydın and Aykaç (2016), interviews with the students in the experimental group show that the children have awareness of matters such as liking animals, protecting animals, recognizing and defining the environment, protecting the plants, protecting the environment, beautifying the environment and preventing environmental pollution. As a result of research Çağlar (2017), according to the children participating in the research, the most important factor causing environmental problems is to throw litter and the most important measure is not to throw litter. The fact that children, who consider people's relationship with the environment negatively, perceive the garbage thrown on the ground as an environmental problem is in line with the findings in the literature (Demirbaş and Pektaş, 2009; Yardımcı and Bağcı, 2010). In terms of this study and other studies, it is possible to say that prevention of environmental pollution is perceived as first not throwing garbage and secondly not harming nature and living creatures.

In terms of information sources, the 3-year-old group usually stated their mother, while the groups of 4, 5, and 6-year-olds stated both their mothers and fathers. While 4, 5, and 6-year-olds stated their information sources like television, the 6-year-old group stated tablet/television. While sources of information in younger ages were stated as mothers and fathers, tablets and televisions were indicated towards the age of 6, but teacher and school were not marked. The reason for not stating the school and teacher as the source of information may be because environmental education is less included in preschool education.

Research conducted by Halmatov and Ekin (2017) studies the contribution of parents to the environmental awareness of preschool children at the ages of 5-6 and establishes that parents have an effect on the environmental awareness of their children. As a result of the research, very few children gave the teacher answers in terms of information sources. In this period when the love of the environment develops, each individual in the family, school, and society should act with this awareness and fulfill the duty that falls on it.

According to Uzun and Sağlam (2005), the environmental awareness of students depends on the quality of the education given, the effectiveness of the teachers, and also on the family. In Turkey, training programs that can improve the point of view of the children in the early childhood period aimed at recognizing, protecting, and enhancing the environment based on social interaction should be diversified (Ogelman and Güngör, 2015). At the secondary school level as a source of information, Olufemi et al. (2014), comparing the environmental pollution awareness, knowledge, and attitudes of middle school students from two South African provinces, students from the two provinces found that they see newspapers as the most important source of information on environmental pollution.

In the interviews conducted with 3-year-old children regarding environmental pollution, it is found out that they generally have clear hand and germ perception in this regard but when we take a look at the paintings they drew, it is observed that they also drew smoke and dirty clouds, and as a result, while their air pollution perception did not reveal itself in interviews, it is detected from their drawings that they have such perceptions as well. Pictures were drawn by children's feelings, thoughts, opinions, growth process, and developmental more descriptive information and details about its properties are available (Wesson and Salmon, 2001). The children had difficulty in expressing the factors that cause air pollution verbally in the interviews, but in their drawings, they were able to reveal their air pollution perceptions more easily and concretely. This is an interesting

conclusion from this study that reveals important information about the educational process, with implications for what can be designed for preschool environmental education programs. With this result, it can be said that it would be more appropriate to use paintings as a data collection tool in younger age groups. As for the children within the 4-year-old group, they highlighted marine pollution and air pollution in their drawings and unlike the other age groups, they diversely drew recycle bins as well. When the pictures of the children from the 5-year-old group are examined, it is seen that they draw trashcan, garbage trucks, garbage collection rocket and that they have a perception of preventing pollution. As a result of human activities, this perception that wastes are produced by humans and is about remediation rather than preventing pollution raises awareness about the treatment of residues. When the pictures of the children from the 6-year-old group are examined, it is seen that, unlike other age groups, their causes of pollution (smoke from the car or house, the cutting of trees) were diverse. Özsoy and Ahi (2014), as a result of the study they conducted, found that elementary school students often included elements such as trees, sun, cloud, human, bird, butterfly, house, apartment, car, mountain, sea, river, garbage, garbage bin in their drawings. When the paintings are examined, it is seen that they often include environmental problems that they can observe in their immediate surroundings such as air pollution, soil pollution, unplanned-structuring, and traffic. It is observed that the students have limited awareness about the types of pollution and the living and non-living elements in the environment.

Özsoy (2012), in his study where he examined the environmental perceptions of elementary school students through their drawings, it is found out that students more frequently include the environmental problems. That they can observe in their immediate surroundings such as air pollution, soil pollution, water pollution and unplanned urbanization in their drawings that they see human beings as a part of nature, and that they think that human beings are affected by environmental problems such as other living things and that human are a factor that pollutes the environment. Also, in this study, children have defined people either as polluting the environment or as trying to clean the polluted environment. One might suggest that, according to children, people are both the cause and the effect of environmental pollution.

It is seen that the drawings towards the age of 6 are more evident in the way of protecting nature, not destroying nature in the way of preventing pollution. While there are polluters at younger ages, as age increases, people who protect the environment have been added. It is possible to say that early children cannot establish a relationship between protecting nature and environmental pollution. The reason for this can be explained by the fact that the sources of information at an early age remain verbal with the parents.

As a result, we tell children what to do and what not to do regarding environmental pollution. However, in preschool education, we should ensure that children are aware of the conflicts and issues necessarily arising from the relationship among people, society, and nature. For practical applications in preschool education, it would be more effective to locally conduct face-to-face observations on children at these ages. Later, studies could be performed on applications, discussions, and preventive measures related to this topic.

Suggestions

Providing environmental education to children at an early age ensures that they both become conscious of the environment and gain the behavior of protecting and developing the environment. For this reason, it is especially important to enrich the pre-school education program related to environmental education (Önder & Özkan, 2013). Integrated activities related to environmental and environmental pollution issues, the global consequences of environmental pollution, and measures to eliminate the negative consequences can be included in the preschool curriculum to raise environmental awareness in children.

It is seen that the aims, attainments, and concepts relevant to environmental education in the preschool curriculum are insufficient. Thus, environment-related activities are required for both qualitative and quantitative purposes. Preschool curriculum should be revised and it should be ensured that environmental education activities by age groups are adopted within the scope of science education. It is recommended that teachers be presented with sample activity practices on how they can raise environmental awareness in children within the scope of the preschool education program. Activities planned to increase environmental awareness in pre-school support the development of environmental awareness in children (Koçak Tümer & Temel, 2018). It is recommended that preschool teachers, who play an important role in the development of children's environmental awareness by implementing these activities, should be given in-service training, conferences, and seminars on how to gain their environmental perception of children.

As a result of the research, given the fact that people have been defined either as polluting the environment or as trying to clean the polluted environment, further researches on the relationship between the perception about people either as caring about or polluting the environment, information resources, and age groups can help to expand on this study. In terms of recommendations for other researchers; parents and preschool teachers can also be included in the study group. It should be conducted in preschool education institutions. The results to be obtained can be made available to people interested in environmental education.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in JESEH journal belongs to the author.

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