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Investigation of Scientific Studies on "Environmental Education of Preschool Children" Published in Turkey Between 2010-2023

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Nilay SERTKAYA¹ Figen Teslime SUYUN² Gökhan AKDEMİR³ Alper ÖZTÜRK⁴


ABSTRACT

This study aims to systematically compile scientific studies on "environmental education of pre-school children" published in Turkey between 2010 and 2023. A qualitative research method and document review model has been used in the study. Considering the ease of access and inclusiveness, 51 scientific articles and master's theses have been identified in the searches performed in the Google Academic database, which met the inclusion criteria of the research. These scientific studies have been examined and analyzed according to the year they were published, sample size, sample group, research method, data collection tool, keywords, topics and results. The findings of the study have showed that the number of scientific studies published on environmental education of preschool children increased significantly in 2017, peaked in 2019, and decreased after this year, falling to half of the number in 2019 in 2022. It has been understood that scientific studies on environmental education of preschool children focus more on pre-school children, preschool teachers and pre-school teacher candidates as the sample group, but less on the parents of preschool children and the programs/documents used in pre-school environmental education. The sample size of the studies has been found to be lower than it should be in quantitative studies. The sample size of the studies has been found to be lower than it should be in quantitative studies. It has been determined that quantitative research methods were used the most in the studies, followed by qualitative and mixed methods. The data of the studies were mainly collected by questionnaire technique and the most frequently used scales were environmental attitude scales, ecological awareness/sensitivity scales and environmental behavior scales. It has been concluded that 76 different keywords were used in the studies and the most frequently used words were preschool education, environment/nature education, preschool children, preschool teachers and environmental attitude. In the findings of the studies, it was noted that pre-school children, parents of children, teachers and teacher candidates attach importance to environmental education, but they are not at the

¹  nil_el82@hotmail.com, Baskent University, Preschool Teaching, Ankara/TÜRKİYE

²  figenteslimesuyun@gmail.com, Pamukkale University Faculty of Education, Department of Preschool Teaching, Denizli//TÜRKİYE

³  gokhanakdemir4@gmail.com, Selçuk University Faculty of Education Primary School Teaching, Konya/TÜRKİYE

⁴  alperozturk71@gmail.com, Gazi University Institute of Educational Sciences, Geography Teacher Education Master's Degree with Thesis, Ankara/TÜRKİYE



desired level in terms of environmental knowledge, awareness, attitude and behavior and they need to be developed.

INTRODUCTION

The environment is the external environment in which all living things relate and interact throughout their lives (Yoleri, 2012). The environment directly affects human life itself and the quality of life. Therefore, environmental problems are one of the important problems that threaten human life, peace and welfare (Laza vd., 2009). Many countries around the world are struggling with different environmental problems. In recent years, extreme heat, excessive rainfall, flood, drought, etc. that affect the world in general are natural phenomena that deeply affect human life. One of the primary reasons for the increase in these natural disaster events is that man destroys nature for more welfare and gain. This destruction of nature also threatens the existence and quality of human life and the existence of other living things (Erten, 2004).

Due to its global nature, environmental problems affect not only one country but all countries. Global warming, unplanned urbanization, reduction of water resources, air pollution, water pollution, wastes are the main environmental problems (Erten, 2004). Since human beings are in the environment and live dependent on the environment, environmental problems directly affect human life. Environmental problems affect the water people drink, the air they breathe and the food they take. The fact that environmental problems have reached very serious dimensions is dangerous enough to end all life. Apart from this, living in a balanced and problem-free environment prolongs human life and provides a peaceful life away from stress (Rohde & Kendle, 1994; Özgüner, 2004).

One of the tools that can be used to solve environmental problems is environmental education. Environmental education aims to provide individuals with knowledge and awareness about the environment, to develop positive attitudes towards the environment and to transform them into behaviors (Erten, 2004). Environmental problems are related to people's lifestyles, value judgments and attitudes and behaviors towards the environment. For this reason, with the environmental education to be given to people, it is aimed to change the lifestyles, value judgments, attitudes and behaviors that lead to environmental problems. With environmental education, it is aimed for the individual to get to know the environment and to acquire a balanced and efficient use of natural resources (Demir & Yalçın, 2014). Depending on the development of industry and technology, the dimensions of the damage caused by man to the environment are increasing. On the other hand, the importance given to environmental awareness and environmental education is increasing.

Environmental education is a broad concept that includes multiple disciplines (Uzunoğlu, 1996). Environmental education is a comprehensive education and addresses the areas of cognitive, affective and psycho-motor learning (Erten, 2004). Environmental education can be formal and informal. The

aim of environmental education is to introduce the environment, to protect the environment, to beautify the environment, to ensure its sustainability, and also to create individuals who are sensitive to environmental problems and willing to take part in solving these problems (Altın & Oruç, 2008). There are different definitions of environmental education. According to one definition, environmental education is the process of providing individuals with concepts, values and attitudes related to the physical, biological and social environment (Akçay, 2006). In another similar definition, environmental education is defined as providing individuals with knowledge, skills, attitudes and behaviors in order to protect the environment and seeing their results (Erten, 2004). According to another definition, environmental education is a lifelong awareness-raising activity about the future of the environment and how to protect it (Dikmen, 2003).

Environmental awareness means being knowledgeable about the environment and having positive attitudes and behaviors towards the environment. Environmental knowledge is information about the role and importance of the environment, environmental problems, solutions of environmental problems and developments related to the environment. An environmentally conscious person is expected to make efforts in reducing harmful wastes, energy saving, water saving, not purchasing environmentally harmful products. It cannot be said that the person who has environmental knowledge but does not do what is necessary for this knowledge is environmentally conscious (Erten, 2004).

The environment surrounds the individual, and the individual performs all his actions within this beleaguered environment. For this reason, all individuals should be educated about the environment without any exceptions. It is stated that as the knowledge about the environment increases, the sensitivity to the environment also increases (Altın & Oruç, 2008; Barraza & Walford, 2002). Environmental education is important at any age. However, providing environmental education at an early age is essential for the formation of environmental awareness at an early age and the acquisition of positive attitudes and behaviors towards the environment at an early age (Wilson, 1996; Schultz, 2002).

Establishing environmental awareness and awareness at an early age is important for both permanence and long-term impact. In the first years of human life, memory, learning and exploration abilities are at a high level (Hill, Borovsky & Rovee-Collier, 2004). During this period, children learn quickly and permanently. It has been observed that individuals who have gained environmental knowledge and awareness in the early period of life and are intertwined with nature continue their positive attitudes and behaviors towards the environment for the rest of their lives and live a life closer to nature (Robertson, 2008). For this reason, it is necessary to provide environmental education to preschool children (Wilson, 1996).

The main purpose of preschool environmental education is to introduce and popularize the environment. The child is tried to be taught that he is related to the environment he lives in and that he is responsible for the environment in which he lives (Tombul, 2006). The fact that the family also participates in and supports environmental education increases the effects of education.

The importance of providing environmental education to preschool children can be discussed in two interrelated dimensions. First, providing environmental education to children at an early age will enable children to gain environmental awareness and with this awareness, they will be individuals who are sensitive to the environment, protect the environment and are willing to take part in environmental problems for the rest of their lives (Wilson, 1996; Cobb, 1998). Thus, it will contribute to the sustainability of the environment. Second, preschool children are curious and learn more easily and permanently by interacting with the environment (Corrie, 1999; Edwards, 2005). Children who learn by interacting with the environment are confronted with a large number of stimuli and their thinking mechanisms develop and they learn to reason about social and environmental problems (Edwards, 2005). With the interaction of the environment, children's ability to establish cause and effect relationships, to analyze, to synthesize, to use language, to creativity and aesthetic skills are developed (Shin, 2008; Essa & Young, 2003). This interaction supports children's cognitive, physical, social and emotional development (Pringle, 2003). Therefore, it can be said that by providing environmental education to children in preschool, children's learning skills can be increased, they can be given a rapid and permanent environmental awareness and the sustainability of the environment can be ensured.

Another important aspect of providing environmental education to preschool children is that they are given an opportunity to get to know and experience nature. With the increase in migration from the village to the city and therefore urbanization, children grow up far from nature. With the decrease in natural playgrounds in cities, children stay in their homes for longer periods of time (Orr, 2002; Yoleri, 2012). Developing technology, internet, smartphones, digital games, etc. factors have further distanced children from natural areas. This distance affects the biological and psychological development of children and causes children to grow up without recognizing animal and plant diversity and understanding their importance (Heywood, 1995, Weilbacher, 1993). With the environmental education to be given to preschool children, this risk is eliminated for these children.

In Turkey, awareness and practices in this field have increased for providing environmental education to preschool children. However, it can be said that environmental education is not at the desired level. In addition, there is no systematic and standard environmental education within the formal education on the environment in Turkey (Yoleri, 2012). There is no compulsory environmental course in primary and secondary education and environmental education is given within other courses such as Life Science, Social Studies, Geography, Science. There is no widespread and standard environmental education policy developed for universities. The responsibilities and activities of institutions on

environmental education are not clearly classified. There is not enough awareness in the relevant institutions on this issue and there is not enough equipment. Environmental education in preschool is also inadequate and these trainings are usually limited to the field of self-care. It is known that some concepts related to the environment are taught to children, but they are not enough. However, it has been observed that giving environmental education to preschool children contributes to children's definition of the environment, valuing the environment and protecting the environment (Demir & Yalçın, 2014). Considering that environmental education is started at the age of 3 in countries such as the USA, England and South Korea, it can be said that more distance should be taken in Turkey (Chu et al., 2007; Sungurtekin, 2001).

One of the important resources to be consulted in order to follow the activities of preschool environmental education and to see the effects of these trainings is the field researches on this subject. It can be predicted that scientific research on preschool environmental education will provide the most accurate and satisfactory information on this subject. Therefore, it is important to systematically review the scientific research on preschool environmental education. In this context, this study aims to systematically review scientific studies on "environmental education of preschool children" published in Turkey between 2010 and 2023.

Method

This study used a qualitative research method and a systematic review of 51 scientific studies on "environmental education of preschool children" published in Turkey between 2010 and 2023 was made using the document review technique. In this context, 51 studies were examined and analyzed according to the years they were published, sample size, sample group, research method, data collection tool, keywords, subject and results.

Of the 51 scientific studies examined, 40 are articles published in peer-reviewed journals and 11 are master's theses. In order to reach the scientific studies on "environmental education of preschool children" published in Turkey between 2010 and 2023, the Google Scholar database was used taking into account the criteria of ease of access and inclusivity. In order to determine the studies suitable for the purpose of the research through this database, the criteria of being published between 2010 and 2023, having a subject of pre-school environmental education and having an article or master's / doctoral thesis published in refereed journals were used.

Three separate searches on Google Scholar between 2010 and 2023 filtered into the words "preschool + environment", "kindergarten + environment" and "kindergarten + environment" yielded 17200, 5730, and 13700 results, respectively. 52 studies were identified in the selection made using the other two inclusion criteria of the research. Since it was understood that an article in 52 studies was produced from a master's thesis in 52 studies, the article was kept and the thesis was removed from the data. Thus, final analyses were carried out on 51 studies.

Findings

The distribution of the studies examined in Table 1 according to the years in which they were published is shown. It is seen that the most publications were made in 2019 with 10 studies. It is understood that the number of studies published in 2018, 2020 and 2017 is high. It was found that there was a significant decrease in the number of studies published in 2021 and there was no increase in the following years.

Table 1. Distribution of Studies by Year of Publication

Article Publication Year	Article Code	Frequency
2010	Ç1, Ç2	2
2012	Ç3, Ç4, Ç5	3
2013	Ç6	1
2012	Ç7	1
2016	Ç8, Ç9, Ç10	3
2017	Ç11, Ç12, Ç13, Ç14, Ç15, Ç16	6
2018	Ç17, Ç18, Ç19, Ç20, Ç21, Ç22, Ç23, Ç24, Ç25	9
2019	Ç26, Ç27, Ç28, Ç29, Ç30, Ç31, Ç32, Ç33, Ç34, Ç35	10
2020	Ç36, Ç37, Ç38, Ç39, Ç40, Ç41, Ç42	7
2021	Ç43, Ç44, Ç45	3
2022	Ç46, Ç47, Ç48, Ç49	4
2023	Ç50, Ç51	2
Total		51

Source: Table 1 Created by the authors.

The distribution of the studies examined in Table 2 according to the sample group is shown. It is understood that the sample groups of the studies can be grouped under five main headings: Preschool children, parents of preschool children, preschool teachers, preschool teacher candidates and programs/documents used in preschool environmental education. In these sample groups, it is seen that preschool children, preschool teachers and preschool teacher candidates are worked more frequently, on the other hand, they work less frequently with parents of preschool children and programs/documents used in preschool environmental education. Among the 51 studies, two studies shown in dark color in Table 2 were found to work with two sample groups at the same time.

Table 2. Distribution of Studies by Sample Group

Sample Group	Article Code	Frequency
Preschool children	Ç3, Ç5, Ç7, Ç8, Ç9, Ç10, Ç11, Ç13, Ç17, Ç19, Ç20, Ç23, Ç31, Ç33, Ç34, Ç38, Ç39, Ç40, Ç44, Ç46, Ç51	21
Parents of preschool children	Ç16, Ç18, Ç22	3
Preschool teachers	Ç2, Ç4, Ç15, Ç16, Ç21, Ç24, Ç26, Ç29, Ç41, Ç42, Ç43, Ç45, Ç48, Ç50	14
Pre-school teacher candidates	Ç4, Ç6, Ç12, Ç14, Ç25, Ç27, Ç32, Ç35, Ç36, Ç37, Ç47, Ç49	12
Documents/programs	Ç1, Ç28, Ç30	3
Total		53

Source: Table 2 Created by the authors.

The distribution of the studies examined in Table 3 according to sample size is shown. It was found that the sample numbers of the articles ranged from 5 to 1049. However, it has been found that the majority of studies have a sample size below 100 and that research is often carried out with a sample of between 51 and 100. It was determined that there were 2 studies using samples between 1 and 10 and 3 studies with a sample size of 401 and above.

Table 3. Distribution of Studies by Sample Size

Sample Group	Article Code	Frequency
1-10	Ç15, Ç48	2
11-20	Ç11, Ç20, Ç21, Ç30, Ç33, Ç39	6
21-30	Ç1, Ç8, Ç29, Ç32, Ç42, Ç45	6
31-50	Ç5, Ç7, Ç9, Ç28, Ç34, Ç49	6
51-100	Ç3, Ç13, Ç17, Ç22, Ç23, Ç27, Ç31, Ç36, Ç37, Ç40, Ç46, Ç51	12
101-200	Ç2, Ç6, Ç10, Ç25, Ç44, Ç50	6
201-300	Ç16, Ç19, Ç43, Ç47	4
301-400	Ç12, Ç18, Ç24, Ç26, Ç35, Ç41	6
401 ve üzeri	Ç4, Ç14, Ç38	3
Total		51

Source: Table 3 Created by the authors.

The distribution of the studies examined in Table 4 according to research methods is shown. It was understood that 27 studies were carried out with quantitative methods, 14 studies were carried out with qualitative methods and 10 studies were carried out with mixed methods using both quantitative and qualitative methods together. It was determined that the researches carried out with quantitative methods mostly used relational scanning, screening and experimental models, respectively. In qualitative studies, the most situation, phenomenology and document examination models were used, respectively. When we look at the studies carried out with mixed methods, it is seen that almost all of these studies are used together with the experimental model and the situation model.

Table 4. Distribution of Studies According to Research Methods

Research Method	Article Code	Frequency	
Quantitative	Scanning	Ç4, Ç6, Ç12, Ç14, Ç22, Ç34, Ç35, Ç36, Ç43	9
	Relational scanning	Ç2, Ç16, Ç18, Ç24, Ç25, Ç26, Ç38, Ç41, Ç44, Ç47, Ç50	11
	Experimental	Ç7, Ç9, Ç10, Ç13, Ç40, Ç46, Ç49	7
Qualitative	Situation	Ç3, Ç15, Ç21, Ç31, Ç37, Ç39, Ç42, Ç48	8
	Phenomenology	Ç23, Ç27, Ç29, Ç51	4
	Document review	Ç28, Ç30	2
Mixed Method	Experimental Status +	Ç1, Ç5, Ç8, Ç11, Ç17, Ç20, Ç32, Ç33, Ç45	9
	Scanning + Status	Ç19	1
Total		51	

Source: Table 4 Created by the authors.

In Table 5, the distribution of the examined studies according to data collection tools is shown. It is understood that 80 different data collection tools were used in the 51 studies examined. It was determined that 53 of these tools were scales used in conjunction with the survey technique. The most frequently used of these scales were environmental attitude scales (14 times), ecological awareness/sensitivity scales (10 times), environmental behavior scales (7 times) and environmental education/knowledge scales (6 times). It was understood that data were collected through interviews in 17 studies and semi-structured interview forms were used in 16 of them. It was determined that observation was used in 6 studies and document review was used to collect data in 4 studies.

Table 5. Distribution of Studies According to Data Collection Tools

Article Publication Year	Article Code	Frequency
Survey	Environmental Attitude Scales	14
	Ecological Awareness/Sensitivity Scales	10
	Environmental Behavior Scales	7
	Environmental Education/Knowledge Scales	6
	Closed-ended questions	2
	Empathic Tendency Scales	2
	Environmental Conscious Consumerism Scale	2
	Affective tendencies scale	1
	Ecological Footprint Calculation Scale	1
	Environmental Identity Scale	1
	Green Chemistry Achievement Test	1
	Scientific Process Skill Test	1
	Altruism Scale	1
	Child Rearing Attitude Scale	1
	TIMI Teele Multiple Intelligences Inventory	1
	Environmental Motivation Scale	1
	Ecological Impact Achievement Test	1
Interview	Semi-structured interview	16
	Focus group interview	1
Observation	-	6
Document review	-	4
Total		80

Source: Table 5 Created by the authors.

Table 6 shows the keywords used in the studies examined and the frequency of their use. In the 51 studies examined, it was found that 57 keywords were used 1 time, 7 keywords were used 2 times, 5 keywords were used 3-5 times, 3 keywords were used 6-10 times, 2 keywords were used 11-15 times, 2 keywords were used 26-30 times, and 1 keyword was used 32 times. The most frequently used keywords are; preschool education, environmental/nature education, preschool children, preschool teachers, environmental attitude, environmental awareness, recycling and children.

Table 6. Keywords Used in Studies and Their Frequencies

Recurrence Frequency	Keywords	Word Count
1 time	Tree, Tree science education, Active learning, Perception, Residual material, Waste, Perspective taking skills, Scientific process skills, Environmental knowledge level, Environmental conscious consumerism behaviors, Self-efficacy related to environmental education, Environmental ethics, Environmental ethics awareness, Environmental awareness, Environmental identity, Environmental consumption, Environmental sensitivity, Motivation for the environment, Environmental protection, Children's literature, Children's pictures, Child-rearing attitude, Theory of multiple intelligences, Perception of nature, Love of nature, Natural environment protection program, Natural and residual material, Relationship with nature, Drama, Case study, Ecological footprint awareness, Ecological footprint, Ecological impact, Ecological literacy, Ethical attitude, Science teaching, Science activities, Traditional method, Semiotic method, Primary science education, Museum education, Altruism, PARI, Regression, Painting, Illustrated	57
2 times	Environmental problems, Environmental pollution, Environmental friendly activity, Environmental education program, Empathic tendency, Nature and environmental practices	7
3-5 times	Environment, Preschool teacher candidates, Early childhood, Sustainable environment, Eco-friendly behavior	5
6-10 times	Child, Environmental awareness, Recycling	3
11-15 times	Preschool teachers, Environmental attitude	2
26-30 times	Environmental/outdoor education, Preschool children	2
31-35 times	Pre-school education	1
Total		76

Source: Table 6 Created by the authors.

The subjects and results of the 51 studies examined in Table 7, Table 8, Table 9, Table 10 and Table 11 are shown separately in date order according to the sample groups. Table 7 presents the topics and results of studies with preschool children. When the subjects and results of the studies were examined, it was determined that these studies were studies that wanted to measure the effect of programs or techniques developed to instill environmental knowledge and awareness in preschool children, studies that examined the environmental knowledge, attitudes and behaviors of preschool children and studies that investigated whether environmental knowledge, attitudes and behaviors of preschool children differed in terms of some variables. From the results of these studies, it has been understood that different programs or techniques developed to instill environmental knowledge and awareness in preschool children are effective and that preschool children who participate in this program and

benefit from these techniques increase their level of environmental knowledge and awareness compared to other children and gain a more positive attitude and behavior towards the environment. The only exception to this seems to be the Ç40. From the findings in the table, it is understood that preschool children perceive the environment with what is happening around them, perceive environmental problems more as (terrestrial) pollution in their own environment, and have developed awareness of the environment and environmental problems. The findings in the table show that the environmental knowledge, consciousness and attitudes of preschool children do not differ according to gender, age and parental education level, however, they differ according to the status of receiving preschool education or environmental education.

Table 7. Topics and Results of Studies with Preschool Children

Code	Author(s)	Subject	Results
Ç3	Halmatov, Sariçam & Halmatov (2012)	Examination of 6 years old preschool children's perception of the concept of environment	It was found that the environmental perceptions of 6-year-old preschool children differed according to the city they live in and their socioeconomic status.
Ç5	Tanrıverdi (2012)	Determining the effect of the education given by creative drama method on the environmental awareness of preschool students	It was found that the environmental awareness levels of preschool students who received education with creative drama method were higher than those of students who did not receive education given by the same method.
Ç7	Yalçın (2013)	Examining the impact of the environmental education program based on the activities of protecting the natural environment on the attitudes of preschool children towards the environment	It was determined that the level of attitude towards the environment of preschool children who received the environmental education program based on the activities of protecting the natural environment was higher than that of preschool children who did not receive this education. It was found that environmental attitude levels did not differ according to gender.
Ç8	Onur, Çağlar & Salman (2016)	Investigation of the effect of paper recycling activities on the waste paper evaluation awareness of preschool children aged 5 years	Paper recycling activities have been found to have a positive effect on the increase of 5-year-old preschool children's knowledge and awareness of how paper is produced, what waste paper is, what savings are, what recycling is, what the environment is and what to do to protect the environment.
Ç9	Uslucan (2016)	Determination of the attitudes of 60-72 months preschool children towards the environment and the effect of the prepared	It was found that the level of attitude towards the environment of preschool children who received the Environmental Education Program was significantly higher than that of those who did not

		Environmental Education Program on children's attitudes towards the environment	receive it. While the level of attitudes towards the environment did not differ according to gender, parents' education level, parents' age, it was found that the attitude levels of children attending preschool were Higher.
Ç10	Yağcı (2016)	Examining the effect of nature and environmental practices on the development of scientific process skills of preschool children	It was determined that nature and environmental practices had positive effects on the development of scientific process skills of preschool children and that there was no difference in these effects in terms of gender.
Ç11	Akbayrak & Kuru-Turaşlı (2017)	Examining the effects of play-based learning activities on the environmental awareness of preschool children	It has been found that play-based learning activities of preschool children increase their environmental awareness and expand their perspectives on the environment.
Ç13	Çabuk & Uçar-Çabuk (2017)	Examining the impact of the green chemistry program developed for children aged 5-6 years on their level of knowledge about the environment	It has been determined that the program named "I Protect the Environment with Green Chemistry" increases the level of knowledge of the environment of preschool children aged 5-6 years.
Ç17	Altınsoy (2018)	Comparison of traditional teaching and technology-supported methods in terms of creating environmental pollution awareness in preschool children	It was found that the level of environmental pollution awareness of preschool children who received environmental education with technology-supported methods was higher than that of preschool children who received environmental education with traditional methods.
Ç19	Coşanay (2018)	Study of environmental attitudes of preschool children	It was concluded that the environmental attitude scores of preschool children were high. It was found that the level of environmental attitudes differed according to school, but did not differ according to gender, age, maternal teaching level and paternal teaching level. It was concluded that the environmental attitude of children focused on environmental cleanliness, environmental protection and saving.
Ç20	Dilli, Bapoğlu-Dümenci & Turgut-Kesebir (2018)	Investigation of the effect of museum education in providing environmental education to preschool children	It has been determined that the knowledge and awareness levels of preschool children who receive museum education about renewable energy sources have increased.
Ç23	Özkul (2018)	Examination of the role of schools in instilling	Preschool children predominantly associate behavioral pollution, air and

		environmental awareness in early childhood and the perceived environmental problems of preschool children	water pollution with environmental problems.
Ç31	Köşker (2019)	Study of preschool children's perception of nature	Preschool children perceive nature as an environment where animals and plants are located outside of human life, in a distant place. Children's knowledge of the basic relationships in nature is not sufficient and children perceive nature predominantly object-oriented.
Ç33	Öztap & Bartan (2019)	Examining the effects of art activities with residual materials in preschool education on children's recycling awareness levels	It has been found that art activities with leftover materials in preschool education increase children's knowledge about recycling, about the materials to be recycled and about the importance of recycling.
Ç34	Tarakçı-Eren, Yılmaz & Alpak (2019)	Examination of kindergarten students' attitudes towards the environment	It was understood that the attitudes of kindergarten students towards the environment were positive and their attitude levels did not differ according to gender.
Ç38	Genç & Arslan (2020)	Examination of the relationship between preschool children's multiple intelligence areas and attitudes towards the environment	It was found that the attitude levels of preschool children towards the environment did not differ according to gender. It was found that the level of attitude towards the environment of those who had previously received preschool education was higher than those who had not received education. It was determined that only social intelligence had a significant (positive) relationship between the attitude levels of preschool children towards the environment and intelligence types.
Ç39	Saz et al. (2020)	Investigation of preschool children's perceptions of environmental pollution	It has been observed that preschool children's perceptions of environmental pollution are mostly focused on pollution on land and are related to household waste. It has been established that cleanliness is associated with happiness.
Ç40	Yılmaz, Yılmaz-Bolat & Gölcük (2020)	Examining the effects of the environmental education program applied to preschool children on attitudes towards the environment	It was concluded that the environmental education program applied to preschool children did not cause a significant differentiation on the children's attitude levels towards the environment.
Ç44	Körükçü & Güngör	Examination of the relationship between the	No significant relationship was found between the attitudes of preschool 60-72

	(2021)	attitudes of preschool 60-72 month children towards the environment and their perspective-taking skills	month group children towards the environment and their ability to take perspectives.
Ç46	Gezgin-Vural & Kılıç-Mocan (2022)	Examining the effect of science activities on raising environmental awareness in preschool children	It has been determined that science activities are effective in bringing environmental awareness to preschool children and that these activities increase children's environmental awareness.
Ç51	Yurttaş (2023)	Determination of the perceptions of preschool children of the age group of five about environmental problems	It was determined that the perceptions of the preschool children of the five age group about environmental problems can be grouped under the headings of the situations they see as environmental problems, the causes of environmental problems and what needs to be done to solve environmental problems, the perceptions of children about environmental problems are focused on pollution and garbage disposal, and the solution suggestions are related to the disposal of garbage in garbage cans, not open areas.
Total			21

Source: Table 7 Created by the authors.

Table 8 shows the topics and results of studies with parents of preschool children. From the findings presented in the table, it is understood that the parents of preschool children have a high environmental awareness and attach importance to environmental education, they educate their children about the environment, these situations of the parents do not differ according to their demographic characteristics, but when the mothers' child-rearing attitude differs, the environmental awareness of the children also differs.

Table 8. Topics and Results of Studies with Parents of Preschool Children

Code	Author(s)	Subject	Results
Ç16	Quadir-Ersoy & Temiz (2017)	Teaching recycling to preschool children by teachers and parents	It has been found that preschool children are taught recycling by the vast majority of their teachers and parents.
Ç18	Bozyiğit & Madran (2018)	Examining the relationship between mothers' child-rearing attitudes and preschool children's socialization as environmentally conscious consumers	It was concluded that mothers were effective in the socialization process of preschool children and according to the mothers' child-rearing attitude, the socialization of preschool children as environmentally conscious consumers differed.

Ç22	Karaca (2018)	Examination of the environmental awareness of preschool children and their parents	It was determined that the environmental awareness of preschool children and their parents was high and the level of environmental awareness that parents attached importance to environmental education did not differ according to demographic characteristics.
Total			3

Source: Table 8 Created by the authors.

Table 9 presents the topics and results of studies with preschool teachers. When the subjects and results of the studies are examined, it is seen that these studies focus on the environmental knowledge, consciousness, attitude and behavior levels of preschool teachers, the factors affecting the environmental knowledge, consciousness, attitudes and behaviors of preschool teachers, whether the environmental knowledge, consciousness, attitudes and behaviors of preschool teachers differ according to demographic variables and the environmental education practices of preschool teachers. It is understood that the studies have obtained different findings about these issues.

However, it can be inferred that preschool teachers believe in the importance of environmental education, but their level of environmental knowledge, consciousness, attitude and behavior is medium or slightly above the middle. Positive relationships were found between the environmental knowledge, awareness and awareness of preschool teachers in general and their behaviors aimed at protecting the environment.

In addition, positive correlations were found between altruism and empathetic education and behaviors aimed at protecting the environment. In addition, teachers who received environmental education had higher levels of environmental knowledge, consciousness, attitude and behavior. It is understood that the environmental knowledge, consciousness, attitudes and behaviors of preschool teachers do not differ predominantly according to age and professional experience, but differ according to gender.

It is understood that preschool teachers attach importance to environmental education, develop applications for this, follow the curriculum, but believe that the environmental education program and facilities should be developed, that they mostly give education in the classroom environment, that they have difficulties especially in field trips and transportation, and that they believe that parents should also be supported for environmental education.

Table 9. Topics and Results of Studies with Preschool Teachers

Code	Author(s)	Subject	Result
Ç2	Günindi (2010)	Examination of preschool teachers' environmental awareness levels, attitudes towards the environment and behaviors towards the protection of the environment	It was found that the level of knowledge and behavior patterns of male preschool teachers towards the environment were higher than those of women. It was found that the level of attitude towards the environment of preschool teachers living in small cities was higher than that of those living in large cities. A significant positive relationship was found between the attitudes of preschool teachers towards the environment and their behaviors towards protecting the environment. No significant relationship was found between environmental knowledge and attitudes towards the environment and behaviors aimed at protecting the environment.
Ç4	Kandır, Yurt & Kalburan (2012)	Comparison of preschool teachers and teacher candidates in terms of the importance of environmental education in preschool teacher education and environmental attitudes	It was found that the attitude levels of preschool teacher candidates towards the environment were higher than those of preschool teachers, however, the impact level of this difference was low.
Ç15	Özkan (2017)	Determination of the opinions of preschool teachers for environmental education	It was concluded that preschool teachers consider the role of the teacher important in environmental education, they think that environmental education is important for the development of the child, they include environmental education activities in their lessons, and they believe that parents should support environmental education.
Ç16	Quadir-Ersoy & Temiz (2017)	Examining how preschool children are taught recycling by their teachers and parents	It has been found that preschool children are mostly taught recycling by their teachers and parents.
Ç21	Güzelyurt & Özkan (2018)	Examination of the views of preschool teachers about environmental education in the preschool period	It has been determined that the skill desired to be gained primarily with environmental education is environmental protection and sensitivity to the environment, environmental education activities are nature study, plant growing, excursions and recycling, environmental education is given in the natural environment, school garden, classroom and home garden, the rate of those who consider environmental education adequate and partially sufficient is a little more than 50%, environmental education problems are that parents do not support

			education and the educational environment is inadequate.
Ç24	Şahinpınar (2018)	Examination of the competence of preschool teachers in terms of knowledge, interest and attitude about the environment and the factors affecting them	It was determined that the environmental knowledge and interests of the teachers were above the middle and the environmental attitude levels were medium. No significant relationship was found between the relevance of preschool teachers to environmental knowledge. There was also no relationship between teachers' environmental knowledge and environmental behavior. A significant positive relationship was found between teachers' interest in the environment and environmental behavior.
Ç26	Bağmancı (2019)	Examination of the levels of environmentally conscious consumerism and environmental sensitivity of preschool teachers and the relationship between them	It was determined that there was a significant positive relationship between the levels of environmentally conscious consumerism and environmental sensitivity of preschool teachers. It was found that the environmental sensitivity levels of preschool teachers did not differ according to gender, age and professional experience. It was found that the levels of environmentally conscious consumerism of preschool teachers did not differ according to age and professional experience, on the other hand, the levels of women were higher than those of men.
Ç29	Karahan-Aydın (2019)	Determination of preschool teachers' views on sustainable environmental education	Preschool teachers' level of knowledge about sustainable environmental education is not enough. It was concluded that teachers did not have difficulty in carrying out sustainable environmental education practices, did not find the relevant program sufficient, perceived outdoor education areas for education as insufficient, found transportation facilities inadequate and found the participation of parents important for sustainable environmental education.
Ç41	Yurtsever (2020)	Examination of the mediating role of altruism in the relationship between the empathic tendencies of preschool teachers and the relationship with nature and environmental consciousness	It has been determined that empathic tendency and altruism have a significant positive effect on the relationship with nature and environmental consciousness. It has been determined that empathic education has a direct effect on the relationship with nature and environmental consciousness as well as an indirect effect on altruism.
Ç42	Zembat et al. (2020)	Determination of the opinions of preschool teachers about natural and residual materials	It was understood that teachers defined natural and residual materials, used natural and residual materials mostly for art and science/nature activities, thought

			that natural and residual materials improved creativity and thinking skills, and parents supported the use of natural and residual materials.
Ç43	Duru & Bakanay (2021)	Investigating the differentiation of preschool teachers' ethical attitudes towards the environment according to gender, professional experience and the type of school they work in.	It was found that the ethical attitude levels of preschool teachers towards the environment were low. It was found that the ethical attitude levels of preschool male teachers towards the environment were higher than those of women and that preschool teachers working in private schools were higher than those of public school teachers. According to professional experience, it was understood that the levels of ethical attitudes towards the environment did not differ.
Ç45	Okyay et al. (2021)	Examination of the challenges faced by preschool teachers in environmental education and their expectations from ecological literacy education for sustainable living	It has been determined that ecological literacy training for sustainable living increases the ecological awareness level of teachers and motivation towards the environment. Teachers evaluated this training as rich in content, educators as experts, participants as willing, theory and practice integrated and permanent.
Ç48	Koçak-Tumer (2022)	Examination of the cases of inclusion of recycling in the activities implemented by preschool teachers	Art and Turkish activities are mostly used for recycling-related activities. Opposite concepts are most often used for activities related to recycling. Book reading/digital story and experiment methods and techniques are the most preferred methods and techniques. Paper rolls, bottles and plastic caps are often preferred for visualization. There are difficulties in field trip and parent support. Activities related to recycling can be applied more easily to children in the 5-6 age group.
Ç50	Engin, Demiriz & Koçyiğit (2023)	Examination of the ecological footprint awareness, eco-friendly behaviors and eco-friendly activities of preschool teachers and the relationships between these phenomena	There are significant positive relationships between ecological footprint awareness, eco-friendly behaviors and eco-friendly activities of preschool teachers. It was determined that the ecological footprint awareness, environmentally friendly behaviors and eco-friendly activities of preschool teachers did not differ according to age, years of service and the institution they worked for. It was determined that the ecological footprint awareness of preschool teachers who received in-service training was higher than those who did not.
Total			14

Source: Table 9 Created by the authors.

In Table 10, the topics and results of the studies with preschool teacher candidates are presented. When the subjects and results of the studies are examined; It is seen that there are studies that measure the environmental knowledge, consciousness, attitude and behavior levels of preschool teacher candidates as low as well as studies that measure high. However, it has been determined that preschool teacher candidates care about the environment, environmental problems and environmental education. The findings of the studies predominantly show that the environmental knowledge, consciousness, attitude and behavior levels of preschool teacher candidates do not differ according to gender, age, socioeconomic status, high school graduated, parents' education level and place of residence. It was determined that the environmental education given to preschool teacher candidates with active learning method and drama method did not make a significant difference in their attitudes and behavior towards the environment.

Table 10. Topics and Results of Studies with Preschool Teacher Candidates

Code	Author(s)	Subject	Results
Ç4	Kandır, Yurt & Kalburan (2012)	Comparison of preschool teachers and teacher candidates in terms of the importance of environmental education in preschool teacher education and environmental attitudes	It was found that the attitude levels of preschool teacher candidates towards the environment were higher than those of preschool teachers, however, the impact level of this difference was low.
Ç6	Öz-Aydın, Şahin & Korkmaz (2013)	Determination and comparison of attitudes, behaviors and thought dimensions of primary, science and preschool teacher candidates towards the environment	It was found that the environmental attitude levels of preschool teacher candidates were lower than those of science and classroom teacher candidates. Among preschool teacher candidates, it was determined that environmental attitude levels did not differ according to gender. A significant positive relationship was found between the environmental attitude levels and environmental thoughts of preschool teacher candidates.
Ç12	Akçay, Halimatov & Ekin (2017)	Examination of the attitudes of preschool teacher candidates towards trees and the environment	It was determined that the attitude levels of female teacher candidates towards trees and the environment were higher than those of men. It was found that the attitude levels of the teacher candidates towards the tree and the environment did not differ according to the place of residence, region and grade level.
Ç14	Karademir, Uludağ & Cingi (2017)	Investigation of the behavior levels of preschool teacher candidates regarding the sustainable environment	It was determined that the sustainable environmental behaviors of preschool teacher candidates did not differ according to grade level, previous education about sustainable environment and membership in non-governmental organizations, on the other hand, they differed according to gender and university. Women's levels

			have been found to be higher than men's.
Ç25	Yıldız (2018)	Examination of the ecological footprints of preschool teacher candidates and the factors affecting the size of ecological footprints	It has been determined that the ecological footprint of preschool teacher candidates is larger than the average in Turkey. It was found that the ecological footprint of women was smaller than that of men. There was no difference in class level or region of residence. It was determined that the strongest determinants of the ecological footprint were the area of goods and services, while the weakest determinant was the area of travel.
Ç27	Erdaş-Kartal & Ada (2019)	Determination of the opinions of preschool teacher candidates about environmental problems and recycling	The perceptions of teacher candidates about environmental problems are limited to the concept of garbage (waste). The solutions suggested by teacher candidates against environmental problems are not to throw garbage on the floor. The level of knowledge of teacher candidates about the purpose and importance of recycling is sufficient, but their knowledge about recyclable materials and what can be done for recycling is not enough.
Ç32	Muşlu-Kaygısız, Benzer & Dilek-Eren (2019)	Examining the effect of active learning-based teaching on preschool teacher candidates' awareness of environmental ethics, environmental behaviors and environmental education self-efficacy	Active learning-based education did not make a significant difference in the awareness levels of environmental ethics and environmental behavior of preschool teacher candidates. On the other hand, it was found that the self-efficacy levels of preschool teacher candidates in environmental education increased after active learning-based teaching.
Ç35	Ultay, Ultay & Çilingir (2019)	Examination of the environmental knowledge levels of preschool teacher candidates and their attitudes towards the environment	No significant relationship was found between environmental knowledge level and attitude towards the environment. Environmental knowledge level and attitude towards the environment do not differ according to gender, class level, family income level, family education level.
Ç36	Alkan & Aktemur-Gürler (2020)	Determining the attitudes of child development program students towards the environment and nature and determining the factors affecting these attitudes	It was determined that the students of the child development program had high levels of knowledge and attitude about the environment and nature. It was found that attitude levels did not differ according to gender, age, place of residence, type of high school.
Ç37	Dinler, Simsar & Doğan (2020)	Examination of the awareness of preschool teacher candidates about recycling	The awareness levels of preschool teacher candidates were measured as high. However, mindfulness behaviors at school were higher and those at home were found to be lower. Awareness-raising resources are TV and the internet. It is perceived that the purpose of recycling is environmental

			cleaning and the obstacle to recycling is unconsciousness.
Ç47	Güngör, Göktaş & Ogelman (2022)	Examination of the level of eco-friendly behaviors, environmental identities and empathic tendencies of preschool teacher candidates and the relationship between them	It was found that the environmental identities of the preschool teacher candidates were strong and the levels of environmentally friendly behavior were high. A significant and positive relationship was found between environmental identities and empathy levels.
Ç49	Öcal & Çavdar (2022)	Examining the effect of ecological impact education applied by drama method on the academic achievements of preschool teacher candidates in environmental courses and their attitudes towards the environment	The ecological impact education applied by the drama method did not cause a significant difference in the attitude levels of the teacher candidates towards the environment. On the other hand, this training has led to a significant increase in the academic achievements of the teacher candidates in the environmental course.
Total			12

Source: Table 10 Created by the authors.

Table 11 presents the topics and results of studies examining preschool programs and books. It is understood that three studies in this field examined the preschool program of the Ministry of National Education, the books prepared for preschool environmental education and TUBITAK's Tree Science Activities for preschool. The purpose, achievements and content of environmental education in the preschool program of the Ministry of National Education were discussed and some deficiencies were expressed. It was concluded that the books prepared for preschool environmental education were insufficient to gain environmental knowledge, awareness and sensitivity to environmental problems. It is emphasized that TUBITAK's Tree Science Activities for preschool focus on nature and tree themes and include activities in classroom environments for small groups.

Table 11. Topics and Results of Studies with Preschool Documents

Code	Author(s)	Subject	Results
Ç1	Gülay & Ekici (2010)	Analyzing the environmental education in the preschool program of the Ministry of National Education in terms of its aims, achievements, concepts, curriculum and processing	The preschool program does not cover the aims and achievements of environmental education in the fields of psychomotor and language. Within the program, social-emotional, cognitive and self-care skills occupy the most place in environmental goals with a rate of 26%. Among all achievements, the rate of gains for environmental education is 16%. 29% of the concepts in the preschool program are related to the environment.
Ç28	Güzelyurt & Özkan (2019).	Examination of the topics covered by the illustrated children's books prepared	Illustrated children's books prepared for environmental education for preschool children were generally found insufficient

		for environmental education for preschool children and the purposes of these books for environmental education	in terms of explaining the need to take precautions against love of nature, environmental problems and environmental problems. These books were not found sufficient in terms of conveying and instilling environmental knowledge and awareness.
Ç30	Köseoğlu et al. (2019)	TUBITAK 4004 Investigation of the quality of the activities of the Wood Science School for Preschool	It was determined that the activities were predominantly themed around nature and trees, included outdoor activities, games, field trips, art and expression activities, were designed for small groups and were designed for the classroom environment.
Total			2

Source: Table 11 Created by the authors.

Discussion, Conclusion and Suggestions

In this study, 51 scientific studies on "environmental education of preschool children" published in Turkey between 2010 and 2023 were examined in terms of the years they were published, sample size, sample group, research method, data collection tool, keywords, topics and results. Gülay-Ogelman & Güngör (2015) examined 16 studies on environmental education in preschool between 2000 and 2014. Compared to the number of 16 studies published between 2000 and 2014 and the number of 51 studies published in the 14-year period between 2010 and 2023, it can be said that the number of scientific studies on environmental education in preschool has increased. On the other hand, the findings of the study showed that there was an increase in 2017 in terms of scientific studies published on the environmental education of preschool children, this increase peaked in 2019 and declined after this year, decreasing to half of 2019 in 2022. It is noteworthy that in recent years the number of scientific studies on environmental education of preschool children has decreased. Future research needs to pay more attention to this issue.

Based on the findings of this research, it is understood that scientific studies on environmental education of preschool children focus more on preschool children, preschool teachers and preschool teacher candidates as a sample group, but less on parents of preschool children and programs / documents used in preschool environmental education. Parents of preschool children are very important to be supportive in the education of children especially in this period. In addition, it was determined that preschool teachers also had requests for parents to support environmental education. Since environmental education given in preschool is provided through programs and documents, these elements need to be studied more in order to understand their effects and role. Future research should therefore be more targeted to both parents of preschool children and the programs/documents used in preschool environmental education.

It was concluded that the sample numbers of 51 studies conducted and examined on the environmental education of preschool children ranged from 5 to 1049. In qualitative researches, it is seen that the number of samples is lower in accordance with the nature of these researches. However, in quantitative researches, it was found that the sample numbers were not very high. It is noteworthy that the sample numbers are not as high as desired especially in the studies of screening and relational screening type (Israel, 1992). In experimental research, sample numbers are relatively low. In addition, it is seen that sample numbers are not supported by power analysis in experimental researches. They may be advised to reach higher sample numbers for future research and also to supplement sample numbers using power analysis.

It was determined that the studies conducted between 2010 and 2023 on the environmental education of preschool children used the most quantitative research methods, followed by qualitative methods and mixed method. Among the quantitative methods, the relational screening model is the most commonly used model. Among the qualitative models, the most case model was used. However, if the studies carried out by mixed methods are included, it is understood that experimental models were used in 16 studies, which constituted approximately 1/3 of the total studies. The fact that the experimental model is used so often can be considered as a positive development.

The findings showed that in the studies on environmental education of preschool children, the most survey techniques were used to collect data and environmental attitude scales, ecological awareness / sensitivity scales and environmental behavior scales were used most frequently in these surveys. After surveys, the most commonly used data collection tool is semi-structured interviews.

It was concluded that the studies conducted between 2010 and 2023 on the environmental education of preschool children used 76 different keywords and the most frequently used among them were preschool education, environment / nature education, preschool children, preschool teachers, environmental attitude, environmental awareness, recycling and children. The word *preschool education*, the most frequently used keyword, was used in 32 of the 51 studies.

Based on the findings of the studies on environmental education of preschool children between 2010 and 2023, it was concluded that different programs or techniques developed to instill environmental knowledge and awareness in preschool children were effective and that preschool children who participated in this program and benefited from these techniques increased their level of environmental knowledge and awareness compared to other children and gained a more positive attitude and behavior towards the environment. In addition, it was found that the environmental awareness and attitude levels of children who received preschool education or environmental education were also high. These findings show that education is effective when preschool children are given environmental education with appropriate programs and techniques. Based on this finding, it

may be recommended for practitioners to expand and develop environmental education programs for preschool children and equip them with appropriate practices and techniques.

The findings of the studies on the environmental education of preschool children between 2010 and 2023 show that parents attach importance to environmental education and strive to educate their children about the environment. In addition, it has been determined that the environmental awareness of children differs depending on the attitude of mothers to raise children. Practitioners should assess mothers' willingness to pursue environmental education and develop practices that will provide parental support for environmental education of preschool children. In addition, in order to educate children correctly and adequately about the environment, it should be planned that parents are educated correctly and adequately about the environment.

The findings of the studies on environmental education of preschool children between 2010 and 2023 on preschool teachers, who are expected to provide correct and adequate environmental education to preschool children, have shown that teachers believe in the importance of environmental education and focus on environmental education practices in their lessons. However, it was concluded that the environmental knowledge, consciousness, attitude and behavior levels of the teachers were medium or slightly above the middle and that there were positive relationships between the environmental knowledge, awareness and awareness of the teachers and their behaviors aimed at protecting the environment. Based on these findings, it can be said that preschool teachers should be trained about the environment in order for preschool teachers to provide accurate and adequate environmental education to preschool students. In support of this inference, the findings of the studies examined in this study showed that teachers who received environmental education had higher levels of environmental knowledge, consciousness, attitude and behavior. On the other hand, it was also determined that preschool teachers had transportation and facility difficulties for physical space, material, field trips while giving environmental education. Practitioners should focus on addressing the challenges they face in environmental education as well as ensuring that preschool teachers are educated about the environment.

The findings of the studies on environmental education of preschool children between 2010 and 2023 on preschool teacher candidates who are expected to provide accurate and adequate environmental education to preschool children have also shown that teacher candidates care about the environment, environmental problems and environmental education. This potential of preschool teacher candidates should be evaluated and it should be ensured that preschool teacher candidates become competent and competent in environmental education both during undergraduate education and with additional education programs. On the other hand, it was concluded that environmental education given by active learning method and drama method did not cause a significant change in the attitudes and behavior patterns of preschool teacher candidates towards the environment. Future research should focus on

techniques that will positively affect the attitudes and behaviors of preschool teacher candidates towards the environment. Practitioners should also strive to develop appropriate programs.

The findings of the studies on environmental education of preschool children between 2010 and 2023 on preschool programs and books indicate that the Ministry of National Education's preschool environmental education program is deficient, that the books prepared for preschool environmental education are not sufficient to gain environmental knowledge, awareness and sensitivity to environmental problems, and that TUBITAK's Tree Science Activities for preschool focus more on nature and tree themes, and has shown that activities are planned for small groups in accordance with classroom settings. Based on these findings, it can be recommended to improve the preschool environmental education program of the Ministry of National Education and to eliminate its deficiencies. It may be recommended that the books prepared for preschool environmental education should be examined more thoroughly and that the same mistakes should not be repeated in the new books to be published. Finally, it may be recommended that environmental education activities be planned in accordance with the current conditions and that they focus on out-of-class activities that are more inclusive of the environment as well as classroom activities.

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