Kastamonu Education Journal, 2021, Vol. 29, No:3, 654-669
doi: 10.24106/kefdergi.762364

| Research Article / Araştırma Makalesi |

STRCT-Inquiry-Based Science Schools in Nature: Effect on Environmental Awareness on Preschool Teachers and Children

TÜBİTAK-Doğada Sorgulama Temelli Bilim Okulları: Okul Öncesi Öğretmen ve Dönem Çocuklarının Ağaçları Tanıma Düzeylerine Etkisi[1]

Pınar Koseoglu[2], Gamze Mercan[3], Ozlem Oznur Gokbulut[4], Esma Pehlivanoglu[5]

Keywords

1. environmental awareness
2. preschool teacher
3. preschool children
4. inquiry based science in nature
5. STRCT 4004 programme

Anahtar Kelimeler

1. çevresel farkındalık
2. okul öncesi öğretmenleri
3. okul öncesi dönem çocukları
4. doğa sorgulama temelli bilim okulları
5.TÜBİTAK 4004 programı

Received/Başvuru Tarihi
02.07.2020

Accepted / Kabul Tarihi
25.12.2020

Abstract

Purpose: The aim of this research was to examine the effect of the "Tree Science School for Preschool Students" Project, which was supported for the second time in the 2017/2018 call period of TUBITAK 4004 Nature Education and Science Schools, based on environmental responsibility awareness from an early age, on the level of recognition of trees by preschool teachers and preschool children.

Design/Methodology/Approach: The research project was carried out in two stages: two days of teacher training with 30 preschool teachers and three days of training with 120 children, 40 of whom were preschool children every day. There were a total of 17 activities carried out within the scope of the project, with 8 for preschool teachers and 9 for preschool children for tree science education. The activities were designed with the help of field experts and based on active learning principles, with a focus on the project's target group's perceptions of nature and trees. The study sample of the research was determined by criterion sampling, one of the purposeful sampling methods, and consisted of 20 preschool teachers and 120 preschool children. The method of the research was the exploratory design from mixed-method research. The data collection tools of the research were the Utopia Given Tree Recognition Test (UGTRT) for preschool teachers, an interview form consisting of two semi-structured open-ended questions, and a drawing and telling technique for preschool children. The quantitative data collected in the research were analyzed using the SPSS 22.0 Program, the Mann Whitney U test, and the Kruskal Wallis test, and the qualitative data were analyzed using the content analysis technique.

Findings: According to the results of the research, it has been found that it has a positive effect on the environmental awareness of both preschool teachers and preschool children.

Highlights: The teacher's role is important in the development of scientific thinking in children. In this context, it is expected that the research findings will be useful in future activities involving tree education, which plays an essential role in preschool children's environmental education.

Öz

Çalışmanın amacı: Bu araştırmanın amacı, TÜBİTAK 4004 Doğa Eğitimi ve Bilim Okulları 2017-2018 çağrı döneminde ikinci kez desteklenen küçük yaşlardan itibaren çevresel sorumluluk bilinci temelli "Okul Öncesi Öğrencilerine Yönelik Ağaç Bilim Okulu" Projesi'nin okul öncesi öğretmenlerinin ve okul öncesi dönem çocuklarının ağaçları tanıma düzeylerine etkisinin incelenmesidir.

Materyal ve Yöntem: Araştırma kapsamında ele alınan proje, 30 okul öncesi öğretmeniyle iki günlük öğretmen eğitimi ve her gün 40 okul öncesi dönem çocukları olmak üzere toplamda 120 çocukla olmak üzere üç günlük eğitim olmak üzere iki aşamada gerçekleştirilmiştir. Proje kapsamında gerçekleştirilen etkinlikler ağaç bilimi eğitimlerine yönelik okul öncesi öğretmenleri için 8, okul öncesi dönem çocuklarına yönelik 9 etkinlik olmak üzere toplam 17 etkinlikten oluşmaktadır. Etkinlikler, proje hedef kitlesinin doğa ve ağaç algılarına ilişkin aktif öğrenme ilkelerine göre alan uzmanlarıyla hazırlanmıştır. Araştırmanın çalışma grubu, amaçlı örnekleme yöntemlerinden ölçüt örnekleme ile belirlenmiş olup, 20 okul öncesi öğretmeni ve 120 okul öncesi dönem çocuklarından oluşmaktadır. Araştırmanın yöntemi karma yöntem araştırmalarından açımlayıcı (exploratory) desendir. Araştırmanın veri toplama araçları, okul öncesi öğretmenleri için Ütopya Verilen Ağacı Tanı (ÜVAT) Testi, yarı yapılandırılmış iki açık uçlu sorudan oluşan görüşme formu; okul öncesi dönem çocukları için resim çizip anlatma tekniğidir. Araştırmada toplanan nicel veriler SPSS 22.0 Programı ile Mann Whitney U testi ve Kruskal Wallis testi kullanılarak; nitel veriler çerik analiz tekniği kullanılarak analiz edilmiştir.

Bulgular: Araştırmanın sonuçlarına göre; hem okul öncesi öğretmenlerinin hem de okul öncesi dönem çocuklarının çevresel farkındalıklarına olumlu yönde etkisi olduğu saptanmıştır.

Önemli Vurgular: Okul öncesi dönemde, çocuklarda bilimsel düşüncenin gelişmesi çevreye yönelik farkındalık ve olumlu tutumlar sergilemelerinde öğretmen anahtar rol oynamaktadır. Araştırma sonuçlarının okul öncesi dönem çocuklarının çevre eğitimi içerisinde önemli bir yere sahip olan ağaç eğitimi konusunda yapılacak etkinliklerde önemli olduğu düşünülmektedir.

[1] This research was supported for the second time in the 2017-2018 call period with the project number "118B518" within the scope of STRCT 4004 Nature Education and Science Schools. We would like to thank the "Rural Environment and Forestry Problems Research Association" and the "Ankara Etimesgut District Directorate of National Education" for their cooperation and support during the study.

[2] **Corresponded Author,** Hacettepe University, Faculty of Education, Department of Biology Education, Ankara, TURKEY; https://orcid.org/0000-0002-6222-7978
[3] Hacettepe University, Faculty of Education, Department of Biology Education, Ankara, TURKEY; https://orcid.org/0000-0001-5515-999X
[4] Ankara Etimesgut District Directorate of National Education, Ankara, TURKEY; https://orcid.org/ 0000-0001-9680-051X
[5] Hacettepe University, Faculty of Education, Department of Science Education, Ankara, TURKEY; https://orcid.org/0000-0003-4372-0924

Citation/Alıntı: Koseoglu, P., Mercan, G., Gokbulut, O.O., & Pehlivanoglu, E. (2021). STRCT-Inquiry-Based science schools in nature: effect on environmental awareness on preschool teachers and children. *Kastamonu Education Journal, 29*(3), 654-669. doi: 10.24106/kefdergi.762364

INTRODUCTION

The biological, physical, social, economic, and cultural environment in which living creatures retain relationships and interact with one another throughout their lives is considered as the environment (T.R. Ministry of Environment and Urbanization, 2017). In another definition, the environment is defined as "all kinds of biotic and abiotic factors that affect a living entity or a living community throughout their lives" (Yücel and Morgil, 1998). The concept of "environment" can be explained in terms of mountains, lakes, streams, atmosphere, plants, animals (natural elements), and buildings, bridges, roads, and houses (human/human elements) using these definitions. It gets the benefits based on its characteristics and basic requirements. However, as social life becomes more complicated, so do environmental issues, which are becoming more numerous and diverse. These issues are caused by the unplanned and unregulated growth of factors such as population, industrialization, urbanization, and tourism (Türküm, 1998). "Air, water, soil, food, light and noise pollution, radioactive pollution, global climate change, acid rain, erosion, destruction of natural life and forest fires, and reduction of biological diversity" are examples of environmental problems that occur as a result of these. Industrialization and urban life, which developed rapidly, exposed many universal problems and made them irreversible, especially in parallel with scientific and technological advancements. These are elements that pose a threat to life's continuation (Long and Salam, 2005). As a result, it falls to the person who is in charge of removing the potentially dangerous elements. This can only be achieved through environmental education. In order for human beings to develop responsibility and sensitivity, first of all, a special bond should be established between nature and humans. Then, people need to be supported to comprehend what the destructive factors are in terms of knowledge. Finally, by aiming to reveal sustainable behaviors, the permanence of education should be ensured (Atasoy, 2015). In this way, people can be sensitized by instilling a sense of responsibility for the environment. To sustain the natural functioning of living things among themselves and protect them from destruction, it is required to raise individuals who are sensitive to the environment and have a high level of environmental awareness. It provides significant improvements in the solution of these problems and needs, thanks to the education of people who will provide fundamental solutions to the environmental problems they face, produce useful services for humanity, and use them in their daily lives while remaining environmentally conscious. As a result, environmental education is defined as the process of influencing people's environmental behavior by expanding their environmental knowledge (Pooley and O'Connor, 2000). When the concept of environmental education is examined in detail, it means actively participating in the development of environmental awareness, achieving environmentally sensitive, permanent, and positive behavioral changes, protecting cultural, aesthetic, historical, and natural values, and actively participating in the solution of environmental problems (T.R. Ministry of Environment and Forestry, 2004). Teachers are regarded as one of the most important elements of environmental protection and education around the world, including in Turkey. While placing environmental issues in the education plans, the teacher should deal with the issues practically through various activities and guide the learning process in accordance with the pace of the students (Haktanır, 2007).

The uniqueness of the learning environment is the most essential element of environmental education, which both distinguishes it from other educational disciplines and allows it to collaborate with them. Environmental education focuses on learning in nature as much as possible. According to this, when learning takes place in nature, it is possible to learn in a thorough and meaningful way. Since environmental education is "teaching the world." Natural learning occurs through direct experiences, resulting in effective development, mental and social learning, as well as the principles of thinking, feeling, and acting. In addition to learning in nature, interesting and appropriate experiences can be provided to learners in museums, science centers, and botanical gardens (Brody, 2005; cited in Çabuk, 2019).

The early childhood period, which constitutes the scope of the research, is defined as the period in which development and learning are the fastest throughout human life, starting with birth and lasting until the age of eight (UNESCO, 2018). Children begin to develop socially, emotionally, cognitively, and physically from the moment they are born, and the basis for the knowledge, skills, attitudes, and behaviors they will acquire throughout their lives is formed during this time (Pianta, Barnett Justice, & Sheridan, 2012). Children's passion for inquiry and questioning are two of their most distinguishing characteristics in early childhood. Everything in life is worth exploring for them (Charlesworth & Lind, 2003). They discover and learn while tasting mulberries plucked from the tree, cuddling a kitten, listening to stones thrown into the water, watching the sunset, and smelling the soil after it has rained (Kahriman-Pamuk, 2019). As a result, many researchers working on early childhood environmental education have emphasized the importance of these critical years for future generations to become environmentally responsible and sensitive adults by emphasizing that attitudes toward the environment begin to form in early childhood (Russo, 2001; Basile, 2000; Davis, 1998; Wilson, 1996). As a result, the importance of early childhood education in the formation of positive perceptions, awareness, and, as a result, positive attitudes and behaviors toward the natural environment (Demir & Yalçn, 2014) are undeniable. It may be difficult for children who have not been exposed to environmental education since childhood to master the subject, absorb it, and grow up to be environmentally conscious adults. According to Chawla (1998), contact with natural areas in the open air during childhood is one of the most influential factors on the human-environment relationship in adult life. Accordingly, it can be claimed that adults who care about and protect the environment are people who interact with nature in their childhood and establish bonds.

Dewey (1997) believed that children's critical thinking skills should be emphasized and that they should participate actively in collaborative problem-solving processes (Dewey, 1997). Dewey's views have shaped today's approaches to early childhood education, such as inquiry-based or exploratory learning (Cremin, Glauert, Craft, Compton, & Stylianidou, 2015). One of the four

essential needs of the twenty-first century is problem-solving, which has been regarded as an important skill to acquire in environmental education (Trilling & Fadel, 2012). Based on these findings, it is critical to encourage children to successfully use their scientific process skills in early childhood environmental education. In this way, children will take responsibility for their own learning as well as play an active role in solving any environmental problem by observing, making predictions, collecting data, interpreting the data, and attempting to draw a scientific conclusion while observing, making predictions, collecting data, and interpreting the data. The key objective of inquiry-based education in nature is to complement and expand on print and electronic media-dominated classroom teaching by combining organized environments and natural environments with relevant contextual experiences. Today's children have little chance of unstructured play and regular contact with the natural world. In this context, nature-based education programs are a tool that can support children's access to the natural world. These education programs are focused on curriculum, behavior, production, protection, and survival (Shanely, 2006; Knapp, 1996).

Children have a strong desire to explore nature in an unmediated and unstructured manner. Nature takes on a feature that helps children's development in outdoor education while providing many different natural elements to them. Children can learn a lot merely by being in nature and examining it with all of their senses (Dinçer, 1999). Teachers' primary responsibility is to provide opportunities for children to interact with nature. While it is highlighted that place-based education should be provided on a regular basis beginning at a young age, studies have found that teachers do not pay enough attention to this issue (Knapp, 1996). Accordingly, preschool teachers are an element that brings dynamism to the process with the responsibilities they take as a guide, sometimes a facilitator, sometimes as an example, and the work they will do in the process from planning to ending the process (Kopnina, 2012). Undoubtedly, in addition to the professional qualifications that every teacher should have, it is expected to have additional knowledge and skills in terms of environmental education. Therefore, teachers need to follow up-to-date knowledge at a certain level in the education of the environment, which is an interdisciplinary science.

As a result, it is obvious that proper use of out-of-school learning environments is required for effective environmental education. Since children are expected to be out of school on a regular basis, to learn about the positive and negative effects of human activities on the functioning and continuity of ecosystems, and to develop more responsible behaviors related to nature in a correct Environmental Education Program (Güler, 2009).In this perspective, nature education activities, which are multidisciplinary in content, can be said to contribute significantly to out-of-school practices, particularly in environmental education. Based on these contributions, the Scientific and Technological Research Council of Turkey (STRCT) has been giving significant support to such nature education activities since 1999. Studies on nature education in Turkey have accelerated with the implementation of the "Scientific Environment Education in National Parks" programs, which were first prepared and initiated by the Earth Sea Atmosphere and Environmental Research Group in 1999 by STRCT (Ozaner, 2004). STRCT continued to support activities within the scope of nature education and science schools with an increasing rate in the following years.

The aim of this study was to examine how the “Tree Science School for Preschool Students Project”, which was based on environmental responsibility awareness from a young age and was supported for the second time in the 2017-2018 call period of TUBITAK 4004 Nature Education and Science Schools, affects preschool teachers' and preschool students' tree recognition levels. Answers to the following research questions were requested for the purpose of the study:

1. According to the outputs of the project, which is applied based on inquiry in nature, is it effective on the tree recognition levels of the preschool teachers participating in the project?
    a. Do the tree recognition scores of the preschool teachers participating in the project show a significant difference according to their place of birth and growth, their answers about the most important benefit of trees, and whether they prefer playing games on a tablet/mobile phone rather than spending time in nature?
    b. What are the preschool teachers' opinions on the knowledge they learned about tree recognition and the activities they want to implement as a result of participating in the project?
2. Are the activities conducted in the project effectively in the preschool children participating in the project's tree recognition, according to the project's outputs based on inquiry in nature?

METHOD/MATERIALS

Research Model

The exploratory design of mixed research method studies was applied in this research to assess the impact of the "Tree Science School for Preschool Students" Project on preschool teachers' and preschool children's recognition levels. Mixed method studies combine quantitative and qualitative data collecting, analysis, and integration to ensure that the data collected by different methods complement each other and that the study results obtained in order to conduct in-depth analysis are stronger (Cresswell and Plano-Clark, 2007). The explanatory design is divided into two stages. In other words, the quantitative part of the study is completed first, followed by the qualitative part of the research based on the quantitative results. According to Cresswell and Clark (2011), this design consists of two sub-patterns. The tool development model is the first stage of the exploratory design, and it determines the main variables, themes, and dimensions of data collecting tools (such as surveys, scales, and inventories) developed using qualitative research. Potential variables and themes are revealed using an inductive approach using qualitative methods such as interviews, observation, and document analysis in the tool development model, and the results are examined by

constructing a quantitative data collection tool based on these variables and themes. The other is the taxonomy development model, where qualitative concepts, models, or processes are tested using qualitative methods (such as surveys and experiments) in order to reveal the key concepts, propositions, and processes in areas where the relevant literature is insufficient. In this model, the propositions that emerge in the qualitative stage are tested for the quantitative stage.

In the research, one group pretest-posttest weak experimental model was used as a quantitative research method. According to Karasar (2015:292), the measurements of the dependent variable of the subjects, who are a single group in this design, are obtained by using the same data collection tool as pre-test before the experimental procedure and post-test after the experimental procedure. Accordingly, the Utopia Given Tree Recognition Test (UGTRT) was applied to the teachers who formed the group before the experimental procedures were started and after the experimental procedures were completed.

A qualitative research method, a case study, was used in the study, which is one of the most commonly used research methods in the field of education. The most important feature of this research method is that the situation studied is chosen because of the person's or community's unique characteristics and is addressed in its own context. In this context, the purpose of a case study is to reveal the attitudes or behaviors of the participants chosen as the research's study group in order to examine a unique person, community, or event and to explain these characteristics or behaviors in a systematic manner (Johnson & Christensen, 2004).

Study Group

Criterion sampling, one of the purposive sampling methods, was used to determine the study group. This sampling method's basic concept is to investigate all situations that meet a predetermined set of criteria (Yıldırım & Şimşek, 2018). The following is a list of criteria that were determined as part of the project's scope:

- To work in preschool education institutions affiliated to the Ministry of Education in Ankara Etimesgut district of preschool teachers participating in the project.
- To go to preschool education institutions affiliated to the Ministry of Education in Ankara Etimesgut district of preschool children participating in the project.
- Voluntary and willingness of teachers and parents of preschool children.

The preschool teachers who made up the research's study group were chosen using the Google Questionnaire Form, with the assistance of Ankara Etimesgut district Ministry of Education, which is one of the project's partners, by explaining the participant selection procedure in detail and ensuring equal opportunity. Preschool children were chosen from among those whose parents agreed to participate.

According to the explanations given above, the study group of the research consisted of 30 preschool teachers and 120 preschool children. Preschool teachers who constituted the study group of the research were stated as T1, T2,…, T30, and preschool children as C1, C2,…, C120.

Data Collection Tools

The data collection tools of the research were the Utopia Given Tree Recognition Test (UGTRT) for preschool teachers, an interview form consisting of two semi-structured open-ended questions, and a drawing and telling technique for preschool children. Data collection tools used for preschool teachers are given below:

Utopia Given Tree Recognition Test (UGTRT): Personal information was collected in the first part of the test, and 22 trees (Thuja, Juniper, Boxwood, Silverberry, Calabrian Pine, Black locust, Birch, Oak, Scotch Pine, Cypress, Maple, Tatar Maple, Whitewood, Redbud, Willow, Hornbeam, Alder, Spruce, Cedar, Larch, Fir, and Linden) were collected in the second part. The test trees were developed with the help of specialists in the field. In the developed test, there were four photographs of each tree, and these photographs consisted of photographs of the tree from afar, where the leaf, trunk, and, if any, fruit can be seen clearly.

Interview Form: It comprises two semi-structured open-ended questions for preschool teachers to evaluate the project's outputs. The following are the questions:

Did you gain practical knowledge from the project? If your answer is yes, could you briefly describe your achievements?

How do you intend to carry out which project activities? Please clarify.

The following are data collection tools for preschool children:

Drawing and Telling Techniques: The technique of drawing and telling pictures is meaningful in that after the activities, children draw pictures about their experiences in the activity, both conceptualizing what they have learned and expressing their experiences in a different way (Önder, 2001). With this data collection tool, it has been attempted to reveal how children perceive their efforts to learn the language of nature and trees.

Application of the Project and Collection of Data

The Utopia Art Science and Game Center, which is rich in tree diversity, is located in the Yazıbeyli District of KahramanKazan District of Ankara. Yazıbeyli is a place rich in biodiversity, which is why the Utopia Science and Art Center was chosen as the project implementation area. Many tree species can be found in the application area, including juniper, fir, spruce, red pine, yellow pine,

stone pine, cedar, Arizona cypress, plane tree, willow, white poplar, birch, oak, redbud, horse chestnut, linden, boxwood, maple, mahaleb, oleaster, apple, pear trees, and so on.

The project was carried out in two stages, two days of teacher training with 30 preschool teachers and three days of training with 120 children, 40 of whom were preschool children every day. There were a total of 17 activities carried out within the scope of the project, with 8 for preschool teachers and 9 for preschool children for tree science education. The activities were prepared with the help of field experts and based on active learning principles, with a focus on the project's target group's perceptions of nature and trees.

Table 1 shows the preschool teacher activity program, which consisted of eight activities that were applied to a total of 30 preschool teachers over the course of two days.

Table 1. Activity program for preschool teachers

Activity name	Activity subject
Communication with creative drama	Communication-interaction/recognition - acquaintance
Teachers learn before children	Tree science school activities
The effect of environmental education on child development	The effect of ecology-based nature education on child development
I learn in my environment	Environmental education in the preschool period
I am an environmentalist as I am conscious	Environmental awareness
What I'm curious about the tree?	Environmental awareness
What is a herbarium?	Herbarium
What I learned and realized?	Getting written and verbal feedback from the participants

Table 2 shows the preschool day activity program, which consisted of 9 activities applied to a total of 120 students, 40 of whom are preschool children, on a daily basis.

Table 2. Activity program for preschool children

Activity name	Activity subject
What's in my nature bag?	Presentation of the place and teachers
Mysterious journey	Observation of living/non-living things in nature
Tree detective	Finding the mate of the tree in the picture in the garden
Hug your tree and feel it	Recognizing the characteristics of trees with the sense of touch
Seed-sapling-tree	Tree growth stages
Leaf specialist	Collecting leaves for herbarium
Let the leaves not be left unfinished!..	Leaves
My tiny herbarium	Making herbarium
What did we learn today?	General evaluation

The activities are described in detail in Köseoğlu, Gökbulut, Pehlivanoğlu, and Mercan's (2019) study titled "preschool tree science school activities."

The data collection tools of the project were applied to the preschool teachers in “Activity 8: What I learned and realized” and to the preschool children in “Activity 9: What did we learn today?” and the data were collected.

Criterion sampling, one of the purposive sampling methods, was used to determine the study group. This sampling method's basic concept is to investigate all situations that meet a predetermined.

Analysis of Data

The SPSS 22.0 program was used to analyze the quantitative data collected in the study. Since the results of the Utopia Given Tree Recognition Test (UGTRT) did not have a normal distribution, they were evaluated using the Mann Whitney U Test and the Kruskal Wallis test, both of which are nonparametric tests.

Content analysis with the MAXQDA 2018 Program was used in the analysis of the qualitative data obtained in the research. The purpose of this analysis is to provide the obtained data to reach the concepts and relationships within the scope of the research (Yıldırım & Şimşek, 2018).

The transcripts of the interviews conducted as part of the research were made by using a computer. During the casting, the researcher conveyed the participants' opinions exactly as they were; no additions or corrections were made to the individuals' expressions. The researcher listened to and evaluated the transcripted interviews. After the castings were completed, they were examined by an expert to determine whether any mistakes had occurred. The analysis steps used by Thomas and Hardene were used to conduct the content analysis (2008). These stages are outlined in the following sections.

Coding Findings: At this stage, the findings in the form of direct quotations or basic concepts extracted from primary research were coded by reading them line by line. The second stage can start after all of the findings have been coded.

Developing Descriptive Themes: The codes obtained at this stage were compared according to their similarities and differences and grouped to form a hierarchical tree structure. Each group formed is called a theme. Each theme was formed to cover the definitions and meanings of the grouped codes.

Generation of Analytical Themes: While this phase stays close to the findings of primary studies in the development of themes, new interpretative structures and explanations were produced by going beyond primary studies in the production of analytical themes. To answer research questions that have been put on hold for a while, descriptive themes developed from inductive analysis should be used to go beyond primary studies. As a result of comparing descriptive themes and discussing them with other researchers, more abstract analytical themes have emerged.

FINDINGS

In this part of the research, the findings obtained with the data collection tools and their comments are given.

Findings Regarding Personal Information of Preschool Teachers Participating in the Project

The findings regarding the personal information of 30 preschool teachers participating in the project are given in Table 3.

Table 3. Findings of the personal information of preschool teachers participating in the project

Personal information		Frequency (f)	Percentage (%)
Gender	Female	30	100%
	Male	-	-
Where teachers were born and raised	City	27	93.1%
	Village/town	2	6.9%
Thoughts about the most important benefit of trees	Human life	17	58.6%
	Climate	9	31.0%
Whether or not it's attractive to explore different types of trees by walking around the forest	Yes	29	100%
	No	-	-
Whether or not to play games on a tablet / mobile phone rather than spending time in nature	Yes	3	10.3%
	No	26	89.7%

According to Table 3, 100% (30 people) of the preschool teachers who participated in the project were women. According to the place where the teachers who participated in the project were born and raised, 93.1% (27 people) were cities, and 6.9% (2 people) were villages/towns. According to the teachers' thoughts about the most important benefit of trees, 58.6% (17 people) stated that it was human life, and 31.0% (9 people) stated that climate. According to the situation that whether or not it's attractive to explore different types of trees by walking around the forest, 100% (29 people) yes, and according to the situation that whether they preferred to play games on a tablet/mobile phone rather than spending time in nature, 10.3% (3 people) yes, and 89.7% (26 people) said no.

Findings Regarding the Tree Recognition Levels of the Preschool Teachers who Participated in the Project

The findings of the tree recognition scores obtained by the preschool teachers who participated in the project from the UGTR Test are given in Table 4.

Table 4. Findings of the tree recognition scores of the preschool teachers who participated in the project from the UGTR Test

Tree names	Those who recognize trees		Those who don't recognize trees	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
1. Thuga	-	-	22	73.13%
2. Juniper	4	13.33%	16	53.33%
3. Boxwood	23	76.16%	1	3.33%
4. Silverberry	27	90%	1	3.33%
5. Calabrian pine	6	20%	17	56.66%
6. Black locust	24	80%	4	13.33%
7. Birch	6	20%	15	50%
8. Oak	24	80%	4	13.33%
9. Scotch pine	9	30%	21	70%
10. Cypress	16	53.33%	9	30%
11. Maple	11	36.66%	5	16.66%
12. Tatar Maple	12	40%	7	23.33%
13. Whitewood	10	33.33%	5	16.66%
14. Redbud	19	63.33%	-	-
15. Willow	27	90%	1	3.33%
16. Hornbeam	22	73.33%	2	6.66%

17. Alder	12	40%	7	23.33%
18. Spruce	3	10%	13	43.33%
19. Cedar	8	26.66%	12	40%
20. Larch	4	13.33%	9	30%
21. Fir	16	53.33%	9	30%
22. Linden	23	76.16%	3	10%

According to Table 4, according to the tree recognition scores of the preschool teachers who participated in the project from the UVAT Test, the trees most recognized by the teachers were; 90% (27 people) silverberry and willow, 80% (24 people) locust, and oak trees, and 76.16% (23 people) boxwood and linden trees; the least known trees were; 73.13% (22 people) are thuja, 70% (21 people) Scotch pine and 56.66% (17 people) were Calabrian pine.

The findings of the pre-test and post-test tree recognition scores of the preschool teachers who participated in the project are given in Table 5.

Table 5. Findings of the pre-test and post-test tree recognition scores of the preschool teachers who participated in the project from the UGTR Test

Post-test - pre-test	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	25	13.00	325.00	-4.390	0.000
Equal	2				

The Wilcoxon Signed Ranks Test was used to determine the findings of the pre-test and post-test tree recognition scores of the preschool teachers who participated in the project, as shown in Table 5. According to the findings, there was a significant difference between the pretest and posttest tree recognition scores of the teachers who took part in the UGTR Test ($p<0.05$). According to this result, it can be said that project training has a positive effect on tree recognition levels.

Table 6 shows the results of the pre-test and post-test tree recognition scores of each tree included in the UGTR Test of the preschool teachers who took part in the project.

Table 6. Findings of the pre-test and post-test tree recognition scores of each tree in the UGTR Test of the preschool teachers participating in the project

Thuja	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	0	0.00	0.00	0.000	1.00
Equal	16				
Juniper	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	0	1.00	1.00	-1.000	0.31
Equal	12				
Boxwood	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	4	2.50	10.00	-2.000	0.05
Equal	1				
Silverberry	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	3	2.00	6.00	-1.732	0.08
Equal	21				
Calabrian pine	n	Order average	Order sum	Z	p
Negative order	11	6.00	66.00		
Positive order	0	0.00	0.00	-3.317	0.00
Equal	11				
Locust	n	Order average	Order sum	Z	p
Negative order	1	2.50	2.50		
Positive order	3	2.50	7.50	-1.000	0.32
Equal	1				
Boxwood	n	Order average	Order sum	Z	p
Negative order	1	0.00	0.00		
Positive order	3	2.50	10.00	-2.000	0.05
Equal	14				
Birch	n	Order average	Order sum	Z	p
Negative order	1	2.50	2.50	-1.000	0.32
Positive order	3	2.50	7.50		

Equal	10				
Oak	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	7	4.00	28.00	-2.646	0.05
Equal	16				
Scotch pine	n	Order average	Order sum	Z	p
Negative order	11	6.50	71.50		
Positive order	1	6.50	6.50	-2.887	0.00
Equal	10				
Cypress	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	12	6.50	78.00	-3.464	0.00
Equal	5				
Maple	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	7	4.00	28.00	-2.646	0.01
Equal	3				
Tatar maple	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	2	1.50	3.00	-1.414	0.16
Equal	1				
Whitewood	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	5	3.00	15.00	-2.236	0.03
Equal	0				
Redbud	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	9	5.00	45.00	-3.000	0.00
Equal	1				
Willow	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	2	1.50	3.00	-1.414	0.16
Equal	23				
Hornbeam	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	4	2.50	10.00	-2.000	0.05
Equal	1				
Alder	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	2	1.50	3.00	-1.414	0.16
Equal	2				
Spruce	n	Order average	Order sum	Z	p
Negative order	2	2.00	4.00		
Positive order	1	2.00	2.00	-0.577	0.56
Equal	6				
Cedar	n	Order average	Order sum	Z	p
Negative order	0	0.00	0.00		
Positive order	6	3.50	21.00	-2.449	0.01
Equal	8				
Larch	n	Order average	Order sum	Z	p
Negative order	4	3.50	14.00		
Positive order	2	3.50	7.00	-0.816	0.41
Equal	3				
Fir	n	Order average	Order sum	Z	p
Negative order	1	3.50	3.50		
Positive order	5	3.50	17.50	-1.663	0.10
Equal	8				
Linden	n	Order average	Order sum	Z	p

Negative order	0	0.00	0.00		
Positive order	3	2.00	6.00	-1,732	0.08
Equal	12				

According to Table 6, there was a significant difference in the pre-test and post-test tree recognition scores of each tree in the UGTR Test of the preschool teachers who participated in the project for Calabrian pine, oak, yellow pine, cypress, maple, whitewood, redbud, and cedar trees. Thuja, juniper, boxwood, silverberry, locust, birch, Tatar maple, willow, hornbeam, alder, spruce, larch, fir, and linden trees showed no significant differences.

The findings of the tree recognition scores obtained by the preschool teachers who participated in the project from the UGTR Test are given in Table 7.

Table 7. Findings of the tree recognition scores of the preschool teachers who participated in the project from the UGTR Test

	N	Minimum	Maximum	Average	Standard deviation
Tree recognition score	28	3	18	3	3.06

Table 7 shows that among the 22 trees in the TUVAT Test, the preschool teachers who participated in the project knew 18 trees the most and 3 trees the least. Furthermore, preschool teachers' average tree recognition score was found to be 3.

The findings of the tree recognition levels of the preschool teachers participating in the project are given in Table 8.

Table 8. Findings of the tree recognition levels of preschool teachers participating in the project

Tree recognition level	Frequency (f)	Percentage (%)
Very little knowers	1	3.4%
Little knowers	6	20.7%
Medium knowers	19	65.5%
Much knowers	2	6.9%

According to Table 8, the findings of the tree recognition levels of the preschool teachers who participated in the project, 3.4% (1 person) was very little knower, 20.7% (6 people) were little knower, 65.5% (19 people) were medium knower, and 6.9% (2 people) were those who know much.

The Mann-Whitney-U test was conducted to find whether there was a significant difference in the tree recognition scores of the preschool teachers who participated in the project according to the place where they were born and grew up. The obtained results are given in Table 9.

Table 9. Findings of the tree recognition scores of the preschool teachers who participated in the project regarding the place where they were born and raised

	Where they were born and raised	N	Order average	U	p
Tree recognition score	City	2	19	17	0.417

Table 9 shows that the tree recognition scores of the preschool teachers who participated in the project were p>0.05 (p=0.417) regardless of where they were born and raised, indicating that there was no significant difference.

The Mann-Whitney-U test was conducted to determine whether there was a significant difference in the tree recognition scores of the preschool teachers participating in the project, according to their answers about the most important benefit of trees. The obtained results are given in Table 10.

Table 10. Findings of the answers given by the preschool teachers participating in the project about the most important benefit of trees by their tree recognition scores

	Answers about the most important benefit of trees	N	Order average	U	p
Tree recognition score	Human life	17	12.03	51.50	0.329
	Climate	8	15.06		

According to the answers given about the most important benefit of trees, there was no significant difference as shown in Table 10 since the p-value for tree recognition scores of the preschool teachers who participated in the project were p>0.05 (p=0.329).

The Mann-Whitney-U test was conducted to determine whether there was a significant difference in the tree recognition scores of the preschool teachers who participated in the project, according to whether they prefered playing games on a tablet/mobile phone rather than spending time in nature. The obtained results are given in Table 11.

Table 11. Findings of the tree recognition scores of the preschool teachers participating in the project on whether they prefer playing games on a tablet/mobile phone rather than spending time in nature

	Whether or not they prefer to play games on a tablet/mobile phone rather than spending time in nature	N	Order Average	U	p
Tree recognition score	Yes	3	13.00	33.00	0.735
	No	25	14.68		

There was no significant difference in tree recognition scores of the preschool teachers who participated in the project, as p>0.05 (p=0.735), whether they preferred playing games on a tablet/mobile phone or spending time in nature, as shown in Table 11.

Findings on the Tree Recognition Knowledge Gained by Preschool Teachers Who Participated in the Project and Their Opinions on the Activities They Want to Apply

The opinions of the preschool teachers who participated in the project on the knowledge they gained about tree recognition were evaluated in 4 different categories in terms of function and concept when considered as a whole. These were learning skills (16), teacher professional development (14), affective skills (1), and attractivity (13). Some examples of preschool teachers' answers to the themes of these categories are given below:

Learning Skills (16): Permanent learning (2), Learning by doing (3), Facilitating learning (3), Learning with cooperation (2), Linking activities (6).

"Yes, I think we won. I had the opportunity to see the trees closely and examine them on site. The process of learning became more permanent. When our teachers made us find the name first, the tree names became more permanent. When the drama was used in other narrative activities as well, it was more effective. I believe I gained a lot of knowledge." **(T11)**

"Yes. I will be able to study in nature by living and doing. I noticed the difference between looking and seeing. My awareness has increased." (T18)

Teacher Professional Development (14): Recognizing trees (8), Classroom management (3), Increasing the repertoire of activities (3).

"Yes. Our teacher, Ozlem, taught me about calm classroom management, which means that classroom management can be done with both verbal and nonverbal communication. In addition, my teacher Gelengül taught me that excessive consumption should be avoided and that everything around us is an element of an activity. Our teacher, Tülay teaches how nature education activities can be carried out with children.We made a herbarium, but the paper needed to be replaced to keep the leaves from falling apart. The purpose I see around me is to learn the names of many trees that I am unfamiliar with." **(T17)**

"Yes. I will do it inside and outside the classroom. My repertoire of events has expanded." **(T2)**

Affective Skills (1): Love of nature (1).

"Yes. It has contributed to our learning of tree species and their properties in nature, in scientific studies with trees. As a preschool teacher, I think that it supports our young age group students with their love of nature, love of trees, and how we can do activities with their properties." **(T28)**

Attractivity (13): The idea of conducting the project's activities (6), Attractivity in trees and nature (1), and active use of cognitive process skills in nature education (3).

"Yes. I think I have learned the ability to actively apply cognitive process skills in nature education. I learned academic knowledge that I can apply to my work in nature education. I also broadened my knowledge by participating in numerous warm-up games." **(T5)**

"Yes. I think I will make the application more efficient by starting with arousing curiosity and phasing out the preparation phase, the implementation phase, and beyond." **(T7)**

The opinions of the preschool teachers who participated in the project on the activities they wanted to implement for tree recognition are given in Figure 1.

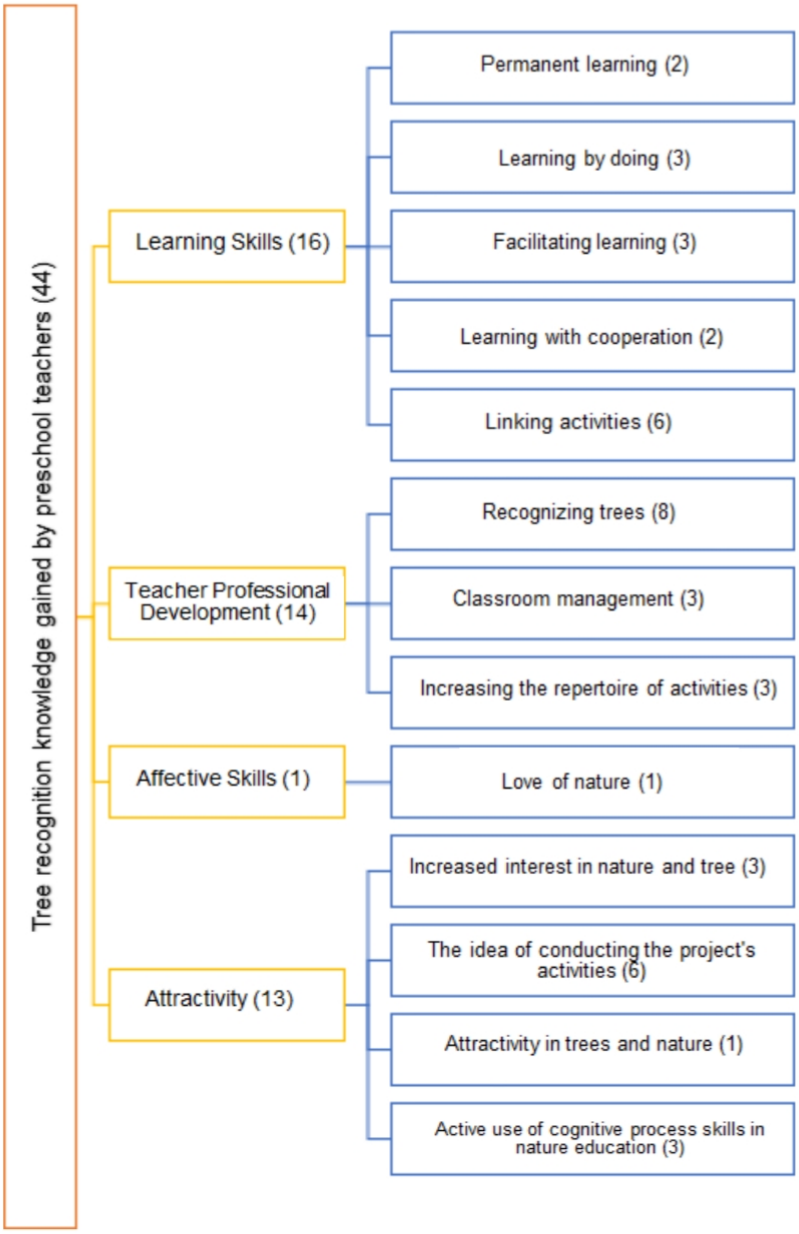

Figure 1. Opinions of preschool teachers who participated in the project on the activities they want to implement for tree recognition

When the views of the preschool teachers who participated in the project on the activities they wanted to implement for tree recognition were reviewed in terms of 6 different categories in terms of function and concept, as shown in Figure 2, they were classified into 6 different categories. These were; Leaf Expert Activity (2), Don't Let Leaves Unfinished Activity (5), Creative Drama Communication Activity (8), My Little Herbarium Activity (13), Tree Detective Activity (8), and Hug Your Tree and Feel Activity (1). Some examples of preschool teachers' answers to the themes of these categories are given below:

Leaf Expert Activity (2): Leaf collection (1), Leaf completion (1).

Don't Let Leaves Unfinished Activity (5): Grouping leaves (4), Completing half of the leaves (1).

Communication Activity with Creative Drama (8): Love of nature (1), Warm-up exercises (3), Recognition and Dating Activities (2), Scout applause, rain applause (2).

My Little Herbarium Activity (13): Applying Hebarium (13)

Hug Your Tree and Feel Activity (1): Teaching concepts in nature (teaching numbers with leaves) (1).

Findings Regarding the Efficiency of the Activities Implemented in the Project in Tree Recognition of Preschool Children Participating in the Project

Figure 2 shows the results of the project's effectiveness based on the technique of drawing and explaining the activities used in the project in the recognition of trees by preschool children who participated in the project.

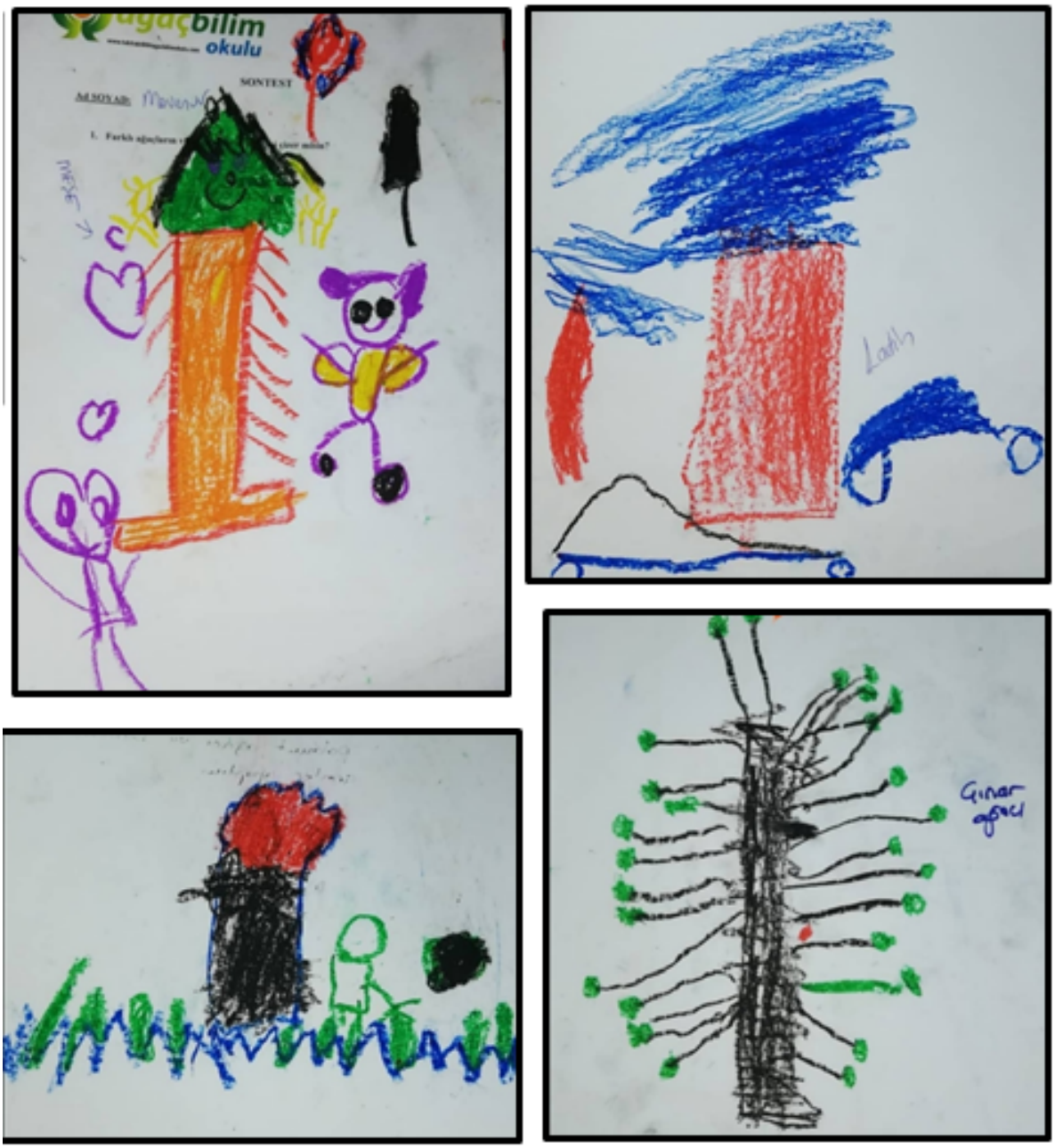

Figure 2. Findings on the project's effectiveness based on the technique of drawing and explaining the project's activities in tree recognition by preschool children who participated in the project

When the preschool children who participated in the project's activities were evaluated, it was found that they drew trees (oak, willow) and tree leaf shapes (poplar, gallnut) in the pictures they drew. Furthermore, it was assumed that the children were having fun while working on the project, as they drew trees, smiling children, and hearts. The findings were based on the children's descriptions of the pictures they drew, which showed that their awareness of the trees around them expanded, that there were living beings other than humans and that they should not harm them.

DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

It was conducted to evaluate the effectiveness of the "Tree Science School for Preschool Students Project", which was supported for the second time in the 2017-2018 call period by STRCT 4004 Nature Education and Science Schools, based on

environmental responsibility awareness from an early age, in determining the level of recognition of trees by preschool teachers and preschool children. The results obtained are discussed in the context of studies conducted in the relevant literature and are given below:

According to the results of the pre-test and post-test tree recognition scores of each tree in the "Utopia Given Tree Recognition Test (UGTRT)" of the preschool teachers participating in the project for the purpose of the research; it was determined that there was a significant difference between the pre-test and post-test scores obtained from calabrian pine, oak, scotch pine, cypress, maple, poplar, redbud, and cedar; while there was no significant difference between pre-test and post-test scores obtained from thuja, juniper, boxwood, silverberry, black locust, birch, Tatar maple, willow, hornbeam, alder, larch, fir and linden trees. In this context, it is reasonable to conclude that the project's activities had a considerable favorable impact on preschool teachers' tree recognition levels. In the research conducted within the scope of the project "Arboriology Education for 9th Grade High School Students", (Köseoğlu, Mercan, and Pehlivanoğlu, 2020), it was determined that the activities carried out in the project had a positive effect on the tree recognition levels of high school students.

It was found that the tree recognition scores of the preschool teachers who took part in the study did not differ significantly based on where they were born and raised, the answers they gave about the most important benefit of trees, or whether they preferred to spend time in nature or play games on their tablet/mobile phone. In the study where teacher candidates studying at Hacettepe and Gazi Universities, Biology Education Department examined the level of recognition of trees in their close environment, the fact that no significant difference was found between the tree recognition scores of teacher candidates and the place where they were born and grew up (village/city) supports the research results. However, in the research conducted by Civelek (2012), Lückmann and Menzel (2013) with different research groups, the level of recognizing the plants and trees in their immediate surroundings of the individuals living in the villages compared to those in the city centers. In the study of Türküm (1998) and Şahin (2018), where they evaluated the awareness of biodiversity in the immediate environment, the fact that those who have animals in their homes or gardens for a part of their lives have higher animal recognition levels than those who do not, doesn't support the findings of the research.

When the opinions of the preschool teachers who took part in the project on the knowledge they gained about tree recognition were summed up, they were categorized into four separate groups based on function and concept; there are learning skills (16), teacher professional development (14), affective skills (1), and attractivity (13). When considering the opinions of the preschool teachers who participated in the project on the activities they intend to implement for tree recognition as a whole, they were categorized into six different categories based on function and concept. These are; Leaf Expert Activity (2), Don't Let Leaves Unfinished Activity (5), Creative Drama Communication Activity (8), My Little Herbarium Activity (13), Tree Detective Activity (8), and Hug Your Tree and Feel Activity (1). Teachers are guides who bring people to peace, happiness, goodness, unity, reconciliation, solidarity, hope, and trust (İnanlı, 2003). As a result, as a role model, the teacher has an additional responsibility to the society to which he belongs. These obligations are crucial in environmental education, as well as in all other fields of education. At this point, the teacher should be an example by attracting the interest and curiosity of the child with his/her positive attitudes towards the environment, environmentally friendly behaviors, and mentality. In this context, it is seen that the knowledge gained by the preschool teachers participating in the project on tree recognition matches the desired results of the project discussed in the study.

When the preschool children who took part in the project had their drawings evaluated, it was found that they drew trees (oak, willow) and tree leaf forms (poplar, acorn) in the activities in the project application. Furthermore, it was assumed that the children were having fun while working on the project, as they drew trees, smiling children, and hearts. The findings were based on the children's descriptions of the pictures they drew, which showed that their awareness of the trees around them expanded, that there were living beings other than humans, and that they should not harm them. Children wanted to be encouraged to think about the products they have made, to understand how to solve issues, the feeling of discovery, and to live. It is possible to learn skills such as questioning, analytical thinking, comparison, expressing opinions, interpretation, concept, and understanding as a result of the activities carried out with the picture sketching and narrative technique. The achievements thus far are discussed (Artut, 2017). In the research, which was developed by Ogelman, Önder, Durkan, and Erol (2015) and carried out within the scope of the TUBITAK project, aiming to introduce children to the soil and concepts related to soil, 5-6-year-old children from families with lower socioeconomic status and their families were included in the study. The significant improvement in children's knowledge of soil as a result of the education supports the research findings. Çabuk (2003) used a picture measurement tool designed by the researcher to interview 200 preschool children between the ages of three and six who attended ten preschool education institutions in order to determine their environmental awareness levels. According to the findings of the study, children's awareness levels rise as they become older. For example, six-year-olds have a higher level of awareness than three-year-olds. In this case, it can be claimed that more detailed awareness studies should be carried out as the children get older by giving environmental education appropriate to their age (Hazır-Bıkmaz & Akben, 2007). In this case, it is of great importance to carry out practices aimed at developing children's knowledge of environmental issues in real-life environments in order for children to love nature, respect nature, and develop a sense of responsibility for nature.

The teacher's role in the development of scientific thinking in children, as well as awareness and positive attitudes toward the environment, is critical during the preschool years. The richness of the opportunities offered, the positive attitudes and behaviors of teachers during environmental activities, and the different methods they use lead children to research, examine, and question,

which are the basis of scientific thinking. Preschool teachers should offer different options in environmental activities and allow children to think and discuss science and nature events (Bowmen-Barba, 1998). Since the mental connections that children make as they "explore" with all of their senses will determine their lifelong learning. It is the basis of early childhood learning to provide opportunities for all children to grow and develop, to attract a sense of curiosity about nature, to be at peace with nature and every part of nature, and to guide them to retain their passion for discovery throughout their life (Kahriman-Pamuk, 2019). In this context, it is expected that the research findings will be useful in future activities involving tree education, which plays an essential role in preschool children's environmental education.

According to the results of the research, suggestions for future research and applications in the field are presented below:

- The results of the research are limited to preschool teachers working in Ankara Province Etimesgut District and preschool children attending preschool education institutions. For this reason, it is advised to conduct research on tree education with different sampling methods and at different grade levels in terms of the generalizability of the results.
- It is thought that the activities developed according to active learning principles regarding the perception of nature and trees within the scope of the project contribute to the literature by considering the opinions of field specialists. Furthermore, it is believed that incorporating tree and nature activities into preschool activities is vital for developing environmental responsibility in children at a young age. Therefore, different activities linked to tree recognition and education can be developed and implemented in future studies.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

This work was supported for the second time in the 2017-2018 call period with the project number "118B518" within the scope of STRCT 4004 Nature Education and Science Schools.

Statements of publication ethics

We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Researchers' contribution rate

The study was conducted and reported with equal collaboration of the researchers.

Ethics Committee Approval Information

Ethics committee approval needed for the research was obtained from Hacettepe University Ethics Committee with the letter dated 03.12.2019 and numbered 76942594-600/00000874452.

REFERENCES

Artut, K. (2017). *Okul öncesinde resim eğitimi*. Ankara: Anı Yayıncılık.

Atasoy, E. (2015). *İnsan-doğa etkileşimi ve çevre için eğitim*. Bursa: Sentez Yayınları.

Bowmen- Barbara T. (1998). Math, science and technology in early childhood education, *14*, https://files.eric.ed.gov/fulltext/ED418774.pdf.

Brody. M. (2005). Learning in nature. *Environmental Education Research*, *11*(5), 603-621.

Charlesworth, R., & Lind, K. K. (2003). *Math and science for young children*. Albany, NY: Delmar.

Chawla, L. (1998). Significant life experiences revisited: A review of research on sources of environmental sensitivity. *The Journal Of Environmental Education*, *29*(3), 11-21.

Civelek, S. (2012). Ortaöğretim 9. sınıf öğrencilerinin çevrelerindeki bitkileri tanıma düzeyleri: Trabzon ili örneği. Yayınlanmamış Yüksek Lisans Tezi. Karadeniz Teknik Üniversitesi Eğitim Bilimleri Enstitüsü, Trabzon.

Cremin, T., Glauert, E., Craft, A., Compton, A., & Stylianidou, F. (2015). Creative Little Scientists: exploring pedagogical synergies between inquiry-based and creative approaches in Early Years science. *Education 3-13*, *43*(4), 404-419.

Creswell, J. W., Plano-Clark, V. L. (2007). *Karma yöntem araştırmaları: Tasarımı ve yürütülmesi* (Çev: A. Delice). Ankara. Anı yayıncılık.

Creswell, J., Plano Clark, V. L. (2011). *Designing and conducting mixed method research* (2nd Edition). Thousand Oaks, CA: Sage.

Çabuk, B. (2003). Üniversiteli öğrencilerinin çevre duyarlılıklarının incelenmesi. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi*, *36*(1), 189-198.

Çabuk, B. (2019).Erken çocukluk döneminde çevre eğitimi ve sürdürülebilirlik. D. Kahriman-Pamuk İçinde, *Çevre eğitimi* (ss.1-38). Ankara: Anı Yayıncılık.

Davis, J. M. (2010). What is early childhood education for sustainability?. In *Young children and the environment early learning for sustainability* (pp. 21-42). Cambridge University Press.

Demir, E., & Yalçın, H. (2014). Türkiye'de çevre eğitimi. *Turkish Journal of Scientific Reviews*, *7*(2), 07-18.

Dewey, J. (1997). *How we think*. Courier Corporation.

Güler, T. (2009). Ekoloji temelli bir çevre eğitiminin öğretmenlerin çevre eğitimine karşı görüşlerine etkileri. *Eğitim ve Bilim*, *34*(151), 30-43.

Haktanır, G. (2007). *Okul öncesi dönemde çevre eğitimi*. Ankara: Türkiye Çevre Vakfı Yayını No: 178.

Hazır-Bıkmaz, F., & Akben, S.N. (2017). *İlköğretimde çevre eğitimi*. Ankara: Türkiye Çevre Vakfı Yayınları.

İnanlı, R. (2003). *Erken çocukluk eğitimi politikaları: Yaygınlaşma, yönetim ve yapılar toplantısı raporu*. Ankara (5-6 Aralık 2003).

Johnson, B., & Christensen, L.B. (2004). *Educational research: Quantitative, qualitative, and mixed approaches*. Boston: Pearson Education, Inc.

Kahriman-Pamuk, D. (2019).Erken çocukluk döneminde çevre eğitimi ve sürdürülebilirlik. D. Kahriman-Pamuk İçinde, *Erken çocukluk döneminde çevre eğitimi* (ss.51-62). Ankara: Anı Yayıncılık.

Knapp, C. E. (1996). *Just beyond the classroom: Community adventures for interdisciplinary learning*. Charleston, WW ERIC Clearinghouse on Rural Education and Small Schools.

Kopnina, H. (2012). Education for sustainable development (ESD): the turn away from 'environment' in environmental education?. *Environmental Education Research*, *18*(5), 699-717.

Köseoğlu, P., Gökbulut, Ö.Ö., Pehlivaoğlu, E., & Mercan, G. (2019). Okul öncesi ağaç bilim okulu etkinlikleri. *İnformal Ortamlarda Araştırmalar Dergisi*, *4*(2), 84-101.

Köseoğlu, P., Mercan, G., & Pehlivanoğlu, E. (2020). "9. Sınıf lise öğrencilerine yönelik okul dışı ortamda gerçekleştirilen ağaçbilim eğitimi" projesinin değerlendirilmesi. *Bolu Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, *20* (2), 904- 931.

Lückman, K., & Menzel, S. (2013). Herbs versus trees: influences on teenagers' knowledge of plant species. *Journal of Biological Education*, *48*(2), 80-90.

Mercan, G., & Köseoğlu, P. (2019). Biyoloji öğretmen adaylarının yakın çevrelerindeki ağaçları tanıma düzeyleri: Ankara ili örneği. *YYÜ Eğitim Fakültesi Dergisi*, *16* (1), 538-560.

Ogelman, G., H., Önder, A., Durkan, N., & Erol, A. (2015). Investigation of the efficiency of "We are learning about the soil with Tipitop and his friends 6" entitled soil education project. *International Journal Of Social Sciences And Education Research*, *1*(2), 476-488.

Ozaner, F. S. (2004). Türkiye'de okul dışı çevre eğitimi ne durumda ve neler yapılmalı. *V. Ulusal Ekoloji ve Çevre Kongresi*, 5-8.

Önder, A. (2001). *Yaşayarak öğrenmek için eğitici drama*. İstanbul: Epsilon Yayınları.

Pianta, R. C, Barnett, W. S., Justice, L.M., & Sheridan, S. M. (Eds.). (2012). *Handbook of early childhood education*. Guilford Press.

Pooley, J. A., & O'Connor, M. (2000). Environmental education and attitudes: Emotions and beliefs are what is needed. *Environment and Behavior*, *33* (5), 711-723.

Russo, S. (2001). Promoting attitudes toward EE depends on early childhood education: What view do we hold?. *Australian Science Teachers' Association*, *17*(4), 34-36.

Sağlam, M., & Uyar, T.S. (2005). Dalga enerjisi ve Türkiye'nin dalga enerjisi teknik potansiyeli Yeksem, *III. Yenilenebilir Enerji Kaynakları Sempozyumu*, 275-279.

Shanely, S. D. (2006). Towards an understanding of an outdoor education program: Listening to participants stories. Unpublished Dissertation. The Graduate School of The University of Florida.

Şahin, Ü.G. (2018). Ortaokul öğrencilerinin biyoçeşitlilik konusunda farkındalıklarının çeşitli değişkenlere göre incelenmesi. Yayınlanmamış Yüksek Lisans Tezi. Akdeniz Üniversitesi Eğitim Bilimleri Enstitüsü, Antalya.

T.C. Çevre ve Şehircilik Bakanlığı (2017). Çevre nedir?, https://yalova.csb.gov.tr/cevre-nedir-haber-220206

Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, *8*(45), 1-10.

Trilling, B., & Fadel, C. (2012). *21st century skills: learning for life in our times* (1st Edition). San Francisco, Calif: Jossey-Bass.

Türküm, A., S. (1998). Çağdaş toplumda çevre sorunları ve çevre bilinci. G. Can içinde, *Çağdaş yaşam çağdaş insan*. Eskişehir: Anadolu Üniversitesi Yayınları.

UNESCO (2018). Themes/early-childhood-care-and-education. https://en.unesco.org/

Wilson, R. A. (1996). Environmental education programs for preschool children. *The Journal of Environmental Education*, *27*(4), 28-33.

Yıldırım, A., & Şimşek, H. (2018). *Sosyal bilimlerde nitel araştırma yöntemleri*. Ankara: Seçkin Yayıncılık.

Yücel, S., & Morgil, F. İ. (1998). Yüksek öğretimde çevre olgusunun araştırılması. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *14*(14), 84-91.