Evaluation of primary school students' awareness about environmental ıssues

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ABSTRACT

This study aims to examine primary school students' awareness of environmental issues by analysing their drawings as reflective pedagogical tools. The Environmental Attitude Scale (EAS) was applied to 208 randomly selected students. The data were analysed using SPSS, and students' total attitude scores were calculated and ranked. Based on these scores, ten students representing high, medium, and low levels of environmental attitudes were selected through maximum variation sampling, forming a final study group of 30 students. The research data were collected using the Draw an Environment Test (DAET) and analysed through descriptive analysis. The analysis was guided by the "Multidimensional Assessment of Environmental Issues" framework. The findings revealed that students predominantly depicted environmental issues related to pollution, natural resource use, and flora and fauna. In contrast, drawings addressing climatic issues, social dimensions of environmental issues, and natural or human-induced disasters were considerably limited. Moreover, no representations were found regarding nuclear pollution, visual pollution, melting glaciers, nuclear accidents, or issues related to poverty and hunger. These findings indicate that although primary school students demonstrate a basic level of environmental awareness, their perceptions are largely confined to concrete, observable, and locally experienced environmental issues. The limited representation of global, abstract, and systemic environmental issues suggests that students' understanding of the environment remains surface-oriented. In this context, the study presents empirical evidence highlighting the critical role of early and comprehensive environmental education in enabling children to develop multidimensional environmental awareness, internalize sustainability values, and establish a meaningful connection with the natural environment.

KEYWORDS: Environmental education; Environmental awareness; Environmental issues; Primary school; Draw an Environment Test (DAET)

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1. Introduction

The importance of nature to human life and the need to preserve the environment are two of the most basic and significant issues. Therefore, environmental awareness and environmental matters are gaining significance day by day. It is of great importance to gain awareness of these matters from an early age. As the next generation of adults, primary school students have a strong opportunity to become interested in environmental issues and develop positive attitudes. Many studies show that developing environmental behaviour and awareness at an early age is more enduring than at later

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ages. Since interest in nature and environmental activities declines with age, younger age groups are more interested in such subjects. It also emphasises the importance of encouraging interest in nature in environmental education programmes (Neurohr et al., 2024). For educational studies on environmental awareness and sustainability, it is essential to comprehend and assess children's awareness of the environment and related issues.

Education, especially primary school education, plays a critical role in developing sensitivity, awareness, and attitude towards the environment (Balkan Kıyıcı, 2009). Raising children's awareness of environmental problems and fostering positive attitudes towards them will lead to important individual and social changes. It is crucial to understand the environmental issues children perceive during this process to take appropriate action and make further efforts. This is because environmental issues not only threaten individual lives but also directly affect society, natural resources, and future generations. The UNICEF report on the direct exposure of a child born in 2020 to environmental problems and disaster experience compared to a child born in 1960 (UNICEF, 2022):

- 2.6 times more drought events;
- 2.8 times more river flooding;
- 2.8 times more crop failures;
- 2 times more forest fires;
- 6.8 times more heat wave exposure.

According to the United Nations (UN), about half of the world's population lives in urban areas (United Nations, 2007), and this rate is expected to reach 70% by 2050 (United Nations, 2011). This situation indicates that living standards will become more difficult, and all disciplines should produce different solutions in their own fields or in interdisciplinary cooperation. As a matter of fact, studies have shown that the authenticity of the learning environment, the rich opportunities of the physical environment, the use of different types of information sources by students, and interdisciplinary thinking can enable them to establish a close relationship with the environment and produce solution-oriented ideas and behaviours (Tan & So, 2018).

Environmental problems pose a great threat on a global scale. In this sense, the field of education should also take responsibility, address environmental issues, and raise individuals who are prone to taking action. People raised in this manner will have an important capacity to handle future environmental challenges and threats (Ayvacı & Çoruhlu, 2009). It is a major concern for the future of our planet that humans, who are ultimately consumers, should be taught environmentally responsible behaviors, such as thinking responsibly when consuming, producing less waste, using less, and reusing more. In a study conducted on this subject, it is stated that conducting waste studies, such as reducing waste and reusing waste in early learning environments, leads individuals to question the principles of recycling. For good waste disposal, it is stated that waste practices such as reducing, reusing, and recycling enable individuals to realise sustainable systems (Merewether et al., 2023).

Studies that increase people's attitudes and awareness from an early age are considered the most effective approach to preventing and improving environmental problems. Previous studies show that environmental education given at later ages increases knowledge but has little effect on attitude change (Pooley & O'Connor, 2000). Accordingly, if the proper mindset and level of awareness are not developed, people might believe that environmental issues are unrelated to their own responsibilities and refrain from accepting responsibility (Kışoğlu et al., 2016). Numerous studies have investigated the relationship between children's environmental actions and their emotional attachment to nature

and ecological beliefs (Collado et al., 2013; Mackay & Schmitt, 2019). Therefore, it is very important for children to develop awareness of and be encouraged about environmental issues from an early age to acquire environmentally friendly attitudes and behaviours (Atasoy, 2005; Chawla, 2009). To develop environmental awareness that enables children to exhibit more sensitive behaviours through education, determining their current awareness levels is a primary step.

Environmental awareness goes beyond understanding environmental issues; it also involves caring about them, adopting a solution-oriented mindset, and acting constructively. A child who grows up with this kind of awareness is likely to be an environmentally informed, sensitive, and consistent individual who makes efforts to keep the environment clean in the years that follow (Kuzu, 2008; Kamaruddin et al., 2016). It is crucial for children to have environmental knowledge and awareness to appreciate and love nature (Hazır Bıkmaz & Akben, 2007). Early childhood is now considered a critical time for acquiring knowledge and awareness, as well as for the development of the mind, body, and emotions. Therefore, the importance of the preschool and primary school period in raising awareness and knowledge about the environment is particularly evident (Ayvaz et al., 1999; Balkan Kıyıcı, 2009). Education tailored to children's grades and interests can be effective in this regard. In fact, a study aimed at teaching children about soil and related concepts found that the training significantly increased children's understanding of soil (Gülay Ogelman et al., 2015).

Numerous studies on children's awareness of environmental problems have reported that children generally have some ideas about local environmental problems and basic types of pollution, but this knowledge is often limited and insufficient, leading to inaction towards solutions (Akkaş Şahin, 2021; Barraza, 1999; Grodzińska-Jurczak et al., 2006; Sethusha, 2006). Children were mostly observed to depict environmental problems and a polluted environment with elements such as garbage, household waste, polluted air, and water, while they depicted the clean environment as a living space full of green color, trees, and other living things (Akkaş Şahin, 2021; Koraş, 2019; Pınar, 2019). Similarly, in another study, it was determined that student drawings depicted basic concepts such as water, air, trees, waste, etc.; however, after the Climate Change Education Program, there were significant changes in students' awareness and attitudes towards climate change, environmental problems, and sustainability (Pala, 2024).

Primary school students with insufficient environmental awareness may develop an insensitive attitude towards nature and the environment. As a result, natural resources are depleted, health issues rise, and polluting behaviors take shape. For this reason, high-quality environmental education programs are essential to ensure that primary school students develop environmentally friendly awareness, attitudes, and behaviors. To prepare these programs, it is essential to accurately assess and disclose the level of environmental awareness.

While many studies have explored children's environmental awareness through surveys and interviews, fewer have analyzed its multifaceted nature using visual representations. Fewer investigations have specifically examined the boundaries of children's environmental perceptions—what they fail to notice, envision, or understand—despite the pedagogical significance of these deficiencies. For this purpose, the present study examined 3rd-grade primary school students' awareness of environmental problems through their drawings. This is because the most fundamental characteristic of children's drawings is to reveal children's ways of thinking, and children's drawings contain much deeper meanings than they appear. From a picture, it is possible to infer the child's developmental characteristics, abilities, feelings, and perceptions (Yavuzer, 2011). Therefore, children's drawings are of great importance as a way of explaining the child's complex and vast universe. In research conducted with children, it has been observed that their thoughts, images, and

perceptions are evident in their drawings (Rodari, 2007). Through drawings, children can recognize their feelings, make sense of the structures in their inner worlds, and express their genuine desires and ideas.

The literature suggests that elementary school students possess some basic awareness of their environment, but the extent to which this awareness is internalized remains unclear. Existing studies mostly focus on measuring students' attitudes or knowledge levels, offering a limited understanding of the quality of children's perceptions of the environment. Furthermore, there is little clarity regarding the boundaries of environmental problem elements that students cannot perceive or identify. This study seeks to address this problem through drawings and textual expressions that provide direct insight into the life experiences and environmental awareness of third-grade elementary school students. The research aims to reveal both the prominent and deficient aspects of environmental problems through students' visuals and written representations that accompany their drawings.

2. Method

2.1. Research Design

Phenomenology, a qualitative research method, was used in the present study. Phenomena in the world we live in present themselves to us in different ways, such as experiences, events, perceptions, concepts, orientations, and situations. Phenomenological research is a study design that seeks to obtain a full understanding of the character, significance, and scope of everyday experiences arising from these factors (Bal, 2016; Husserl, 2012). The phenomenology design deals with phenomena that we are aware of but do not have an in-depth understanding of. The aim here is to understand the essence of a phenomenon by reaching a common understanding through the experiences of individuals (Creswell, 2018; Yıldırım & Şimşek, 2016). In other words, phenomenology is the process of seeing the essence of a phenomenon beyond its external appearance, getting to that essence, and comprehending it (Patton, 2014). From this perspective, the study adopts a phenomenological approach, considering children's drawings not only as visual aesthetics but also as lived expressions of students' subjective experiences and the meanings they attribute to environmental issues.

2.2. Participants and Procedure

The research was conducted with 3rd-grade primary school students in the Melikgazi District of Kayseri Province during the 2022–2023 academic year. The study group consisted of 30 students selected using maximum diversity sampling from the data of the "Environmental Attitude Scale for Primary School Students (EAS)" administered to a randomly selected total of 208 primary school 3rd-grade students, comprising 94 males and 114 females. In maximum diversity sampling, a heterogeneous group is formed by choosing participants with different characteristics (Creswell, 2021). Purposive sampling methods, such as maximum variation, are frequently used in qualitative research. This approach aims to reach scenarios that contain rich data for the study's depth (Patton, 2014).

To ensure maximum diversity in the study, students with varying environmental attitudes were chosen because their attitudes can influence their understanding of environmental issues (Atasoy, 2019). Accordingly, "Environmental Attitude Scale for Primary School Students (EAS)" was applied to 208 students. Scores obtained from the scale were calculated using SPSS. The total scores obtained from the scale were ranked from high to low. This way, the top, bottom, and middle ten students were determined. A total of 30 students, 10 students from high environmental attitude level (H), 10 students from medium environmental attitude level (M), and 10 students from low environmental attitude level (L) were included in the present study.

2.3. Measures

In the present study, students' demographic information was obtained using the "Personal Information Form". "Environmental Attitude Scale for Primary School (EAS)" was used to determine which students to include in the study. Qualitative data were obtained by applying "Draw an Environment Test (DAET)", which includes drawings and explanations of students about environmental problems, to 30 students who were determined to have different attitude levels.

The Environmental Attitude Scale for Primary School (EAS) was developed by Artvinli and Demir (2018) to assess primary school students' attitudes towards the environment. The scale consists of 3 sub-dimensions: 27 items in the Positive Environmental Behaviors dimension, 10 items in the Environmental Knowledge and Awareness Dimension, and 6 items in the Negative Environmental Behaviors dimension, for a total of 43 items. According to the validity and reliability study conducted by Artvinli and Demir (2018), the factor loads of the scale items are in the range of .32–.85. Cronbach's Alpha coefficient is between 0.71 and 0.94 in the subscales and 0.93 in the whole scale.

The Draw an Environment Test (DAET) is an adaptation of Chambers's (1983) Draw a Scientist Test (DAST) for environmental issues. An A4-sized sheet of paper is divided into two sections. In the first section, there is a space for students to draw a picture about environmental issues. In the second section, there is space for students to draw and write about the depicted environmental issue. Students were given one class hour (40 minutes) for the Draw an Environment Test.

2.4. Data Analysis

EAS data collected to determine the study group were entered into SPSS. The sum of the scores from the EAS items was calculated using SPSS. The total scores of the students from EAS were ranked from high to low. Descriptive analysis, a qualitative method, was used to examine data obtained from the Draw an Environment Test (DAET).

Descriptive analysis aims to systematically organize and interpret the data collected in the study. The data are typically categorized based on pre-designed themes, cause-and-effect links between the results are established, and summaries and comparisons are made (Kitzinger, 1995; Kvale, 1994; Patton, 2014). In the present study, the deductive method was adopted for descriptive analysis. In deductive analysis, data are examined using predetermined codes and themes. In analyzing the student drawings through descriptive analysis, an evaluation table with codes and themes was created by using Atasoy's (2015) "Multidimensionality of Environmental Problems" table. The data were analyzed and evaluated according to this table. Radar graphs were used to present the data more concretely. Radar graphs show the distance of a theme or code from the central point, indicating its density in the data. If a theme or code is at the center, it means it is not encountered in the drawings; if it is at the farthest point from the center, it means it is frequently encountered in the drawings.

2.5. Validity, Reliability, and Ethical Considerations

In qualitative research, it is very important that different researchers examine, compare, and reconcile the findings to ensure the reliability of measurement results (Büyüköztürk et al., 2018). An agreement between independent evaluators is used to examine the reliability of results. High inter-coder agreement indicates high reliability (Büyüköztürk et al., 2018). According to Miles, Huberman, and Saldana (2014), there should be 85–90% agreement between coders.

In this regard, the student drawings in the present study were evaluated through descriptive analysis using the evaluation table, which contains codes and themes derived from Atasoy's (2015) "Multidimensionality of Environmental Problems" table. The drawings were analyzed by two different

evaluators. The results of the analysis were calculated as 90% using Miles and Huberman's (1994) reliability percentage formula (Agreement / (Total Agreement + Disagreement)). This rate was considered acceptable for internal consistency.

Afterwards, the evaluators analyzed the items on which they disagreed one by one and reached a consensus. To support the results and provide a clear, accurate picture of the perspectives of the students who participated in the study, direct quotations were included. Using these techniques, the goal was to thoroughly and methodically analyze the data and clearly present the results.

Necessary permissions and approvals were obtained to ensure ethical compliance in the study. Therefore, ethics committee approval was obtained from Erciyes University Social and Human Sciences Ethics Committee. Afterwards, permission for the research application was obtained from the Kayseri Provincial Directorate of National Education. Parental consent forms were obtained from all participants, and thus the study was conducted in accordance with all necessary ethical procedures.

3. Findings

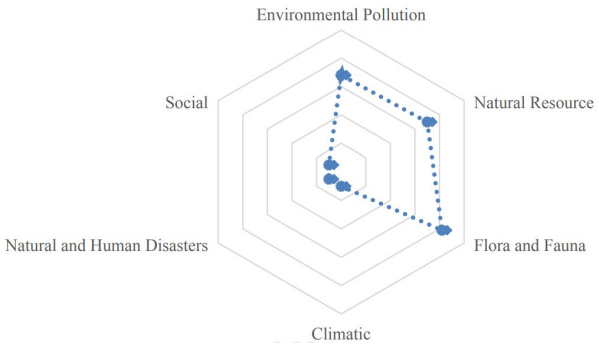
Before selecting the qualitative study group, the Environmental Attitude Scale (EAS) was administered to 208 third-grade students, the study's subjects, to determine the general distribution of environmental attitudes. Descriptive statistics revealed that the students' average environmental attitude scores were near the moderate level (M = 2.28, SD = 0.37), with scores ranging from 1.42 to 2.94 (Table 1). The distribution played a significant role in identifying relatively high, medium, and low attitude groups among the students. Based on the results and rankings derived from students' averages, the High attitude group had the highest scores, the Low attitude group the lowest, and the Medium group had student drawings close to the average. Consequently, 10 students representing different attitude levels were selected, and a total of 30 students' drawings were examined.

Table 1 ***Statistics of Environmental Attitude Scale (EAS) Scores***

Variable	N	Mean	SD	Min	Max
Environmental Attitude Total Score	208	2.28	0.37	1.42	2.94

30 drawings by primary school students were selected and analyzed using the "Multidimensionality of Environmental Problems" table. In the drawings, the themes of Flora and Fauna and Natural Resource Utilization are the most often mentioned environmental issues. Climatic, Natural-Human, and Social themes, which are relatively less common than these themes, were included in the drawings at a similar rate. The findings regarding primary school students' drawings on environmental issues are shown in Figure 1.

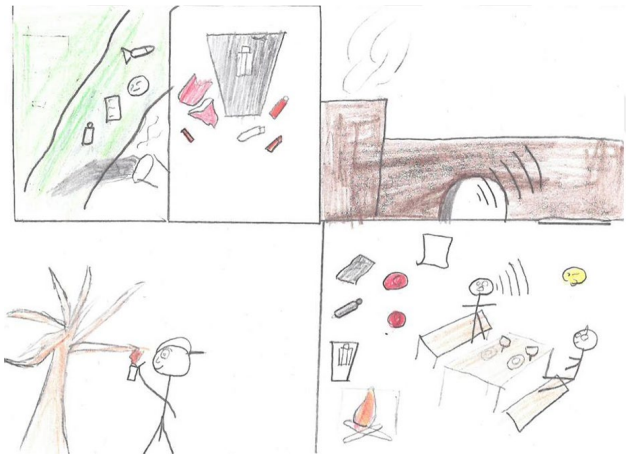
Figure 1 ***The inclusion of environmental issues in drawings***



When Figure 1 is analyzed, it is evident that students included all dimensions of environmental issues, but mostly depicted the environmental problems they observed in their immediate surroundings. While there were more drawings related to environmental pollution, natural resources, flora and fauna, there were relatively fewer drawings related to climatic, natural, and human disasters, as well as the social dimension. During the analysis, it was noteworthy that environmental problems such as "air, water, soil pollution, garbage and waste problems", which can be directly observed and directly exposed, were found in almost every drawing, while environmental problems that cannot be directly observed such as "global warming, acid rain, ozone depletion, melting glaciers" were not found in any drawing.

The drawings requested of the students were examined in detail within the scope of the specified dimensions. At the same time, the students' explanations of their drawings in text, in addition to their drawings, allowed for a multifaceted evaluation of the study. Accordingly, the drawings were primarily coded and named according to their environmental attitude values. For example, the drawing coded Y-7 in Figure 2 is by a student with a high environmental attitude. In the Y-7 drawing, the student highlighted the problems of fire, water pollution from waste dumped into the seas, soil pollution from garbage, air pollution from smoke emitted by factory chimneys, and noise pollution caused by two people speaking loudly. The student numbered their drawings and provided the following text: "1. A stream polluted by factory waste. 2. Not throwing garbage in the trash. 3. Factory smoke and noise pollution. 4. Burning and cutting down trees and the problem of clean air. 5. Noise pollution and throwing garbage on the ground." In conclusion, the student addressed multiple environmental pollution issues in their drawing. Along with their textual interpretation, this shows that the student was able to align the multifaceted and interrelated nature of environmental problems with their drawing, demonstrating a high level of awareness.

Figure 2 ***Example of an environmental problem in a drawing (Y-7)***

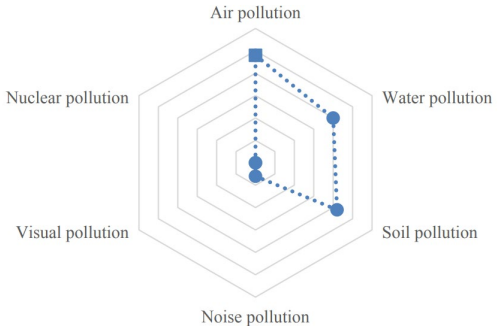


In the following sections, each theme is discussed under a separate heading. First, radar graphs for the sub-dimensions shown in the drawings are provided. Afterwards, the findings under each theme were evaluated by including student drawings and students' direct statements, accompanied by their codes. Presented below are the themes and the dimensions under each theme, analyzed in order.

3.1. Findings Related to the Environmental Pollution Dimension

Environmental pollution is one of the dimensions students most often include in their drawings. Under the dimension of environmental pollution, there are sub-themes of air pollution, water pollution, soil pollution, noise pollution, visual pollution, and nuclear pollution. The radar graph of the intensity of these sub-themes in the drawings is given in Figure 3.

Figure 3 ***The extent to which environmental pollution sub-dimension is included in the drawings***



When Figure 3 is analysed, it can be observed that students included air, water, and soil pollution in their drawings related to the environmental pollution dimension. Noise pollution was rarely included in the drawings. Visual and nuclear pollution issues were not encountered in the drawings.

Drawing description of the student coded O-9 (Figure 4):

> "First of all, the smoke from factories worsens the air and leads to a bad climate. If we dump glass at the base of trees or in forests, a fire can start from that glass. Factory waste can enter the sea and destroy marine life. Cars also make loud noises, contributing to noise pollution. Smoke from cars also causes climate change. Let's protect the nature."

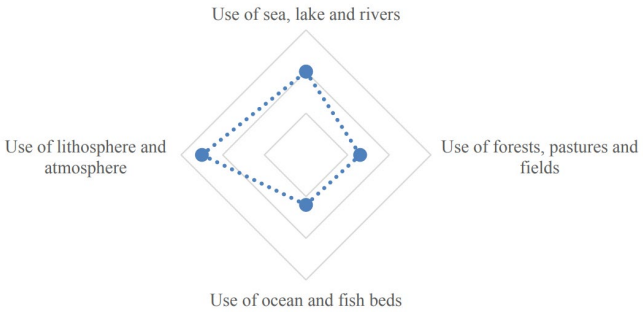
Figure 4 ***Example of noise pollution drawing (O-9)***

According to the analysis of the student's drawing, the honking of cars on the road was used to convey noise pollution. It was also observed that the student depicted more than one form of environmental pollution in his drawing. The drawing depicts water pollution caused by the release of industrial waste into the ocean and the extinction of marine fish. The fact that glass waste thrown into wooded areas, when heated, causes fires and contributes to soil pollution, while factory fumes and exhaust gases contribute to air pollution. At the same time, it is noticeable that the clouds are crying and unhappy, and the sun has a sad expression.

3.2. Findings Related to the Natural Resource Utilisation Dimension

Natural resource utilisation is one of the dimensions students most often include in their drawings. The dimension of natural resources includes the sub-themes of use of sea, lake, and rivers; use of forests, pastures, and fields; use of ocean and fish beds; and use of lithosphere and atmosphere. The radar graph of the intensity of these sub-themes in the drawings is shown in Figure 5.

Figure 5 ***The extent to which natural resource utilisation sub-dimension is included in the drawings***

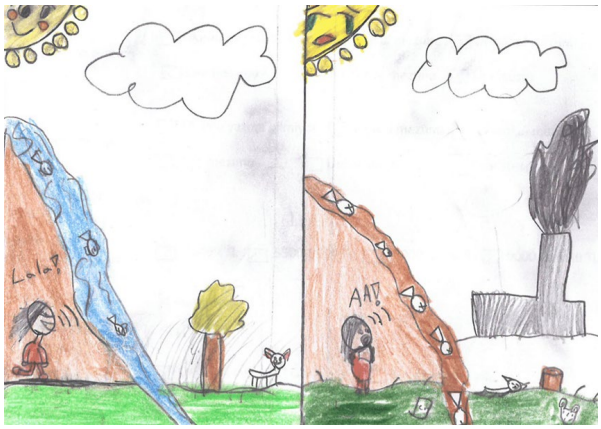


When Figure 5 is analysed, it is understood that students included all sub-dimensions of the natural resource utilisation dimension in their drawings. The use of fields, pastures, and forests, as well as the ocean and fish beds, is comparatively underrepresented in these drawings.

Drawing description of the student coded O-6 (Figure 6):

> "I once went to a park with a wonderful garden. Everything was sparkling. The day I wanted to go there with my family was the last day I saw that beauty. A week later, I went back with my family. By the time we got there, the fish, birds, and cats were dead in that rubbish dump. The water was no longer flowing. The trees had been cut down. My heart ached at that moment. We used some of the bags we had to collect the waste."

Figure 6 ***Example of drawing the use of forest-pasture-field, sea, lake and rivers (O-6)***

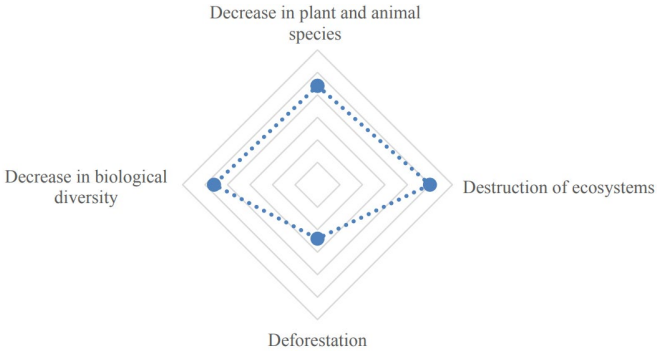


In the drawing coded O-6, the student divided the drawing area into two sections. These sections show that the student drew the same place at different times. The first part depicts the sun in the sky and a cat looking happily. It is noteworthy that the child in the picture is singing with joy. The river is blue, with many fish swimming in it; green areas and a green tree are depicted. The second part shows an environment that is exactly the opposite of the previous one. The sun is weeping, the fish and the cat are dead, the tree has been cut down, and a factory has been built in its place. The colour of the river has changed from blue to brown. The child girl is sad and surprised by what they see. When the whole drawing is analysed comparatively, it can be seen that the use of forests, pastures, and fields, as well as rivers and fish beds, is included.

3.3. Findings Related to the Flora and Fauna Dimension

The use of flora and fauna is one of the dimensions students most often include in their drawings. Sub-themes within the flora and fauna dimension include declines in plant and animal species, ecosystem destruction, declines in biodiversity, and deforestation. The radar graph of the intensity of these sub-themes in the drawings is shown in Figure 7.

Figure 7 ***The extent to which flora and fauna sub-theme is included in the drawings***

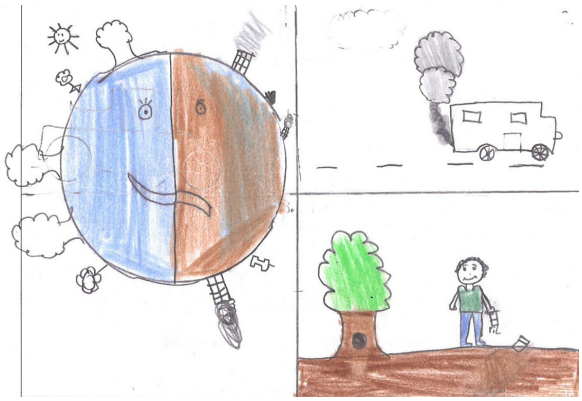


When Figure 7 is analysed, it can be observed that students included all the themes under the flora and fauna dimension in their drawings. However, it is noted that drawings on deforestation are fewer than those on the other themes.

Drawing description of the student coded O-7 (Figure 8):

> "I wanted to express the environmental pollution in my drawings."

Figure 8 ***Example of a deforestation drawing (O-7)***

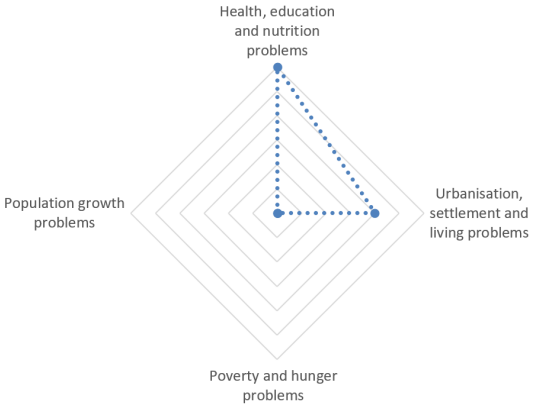


In the drawing coded O-7, the student divided the drawing area into three sections. In the first section, the Earth is divided in the middle, and there are drawings of what could be interpreted as the absence and presence of environmental pollution. According to this drawing, while the clean side of the Earth is happy, blue, and has plenty of trees and plants, the polluted side shows that the plants have disappeared and the Earth has become treeless. The fact that this half of the Earth is unhappy and brown emphasises the consequences of environmental pollution. It is clear from the drawings that environmental issues like pollution and deforestation are depicted in this image. In other sections, the exhaust fumes emitted by a bus and a drawing of a child throwing battery waste into the soil draw attention. It is evident that the student is aware that car exhaust emissions cause air pollution and battery waste left in nature causes soil pollution.

3.4. Findings Related to the Social Dimension

One theme that appears less frequently in student drawings is the social dimension of environmental issues. Sub-dimensions under the social dimension include health, education, and nutrition problems; urbanisation, settlement, and living problems; poverty and hunger problems; and population growth problems. The radar graph of the intensity of these sub-themes in the drawings is shown in Figure 9.

Figure 9 ***The extent to which social dimension is included in the drawings***



When Figure 9 is examined, it is observed that the student drawings include the themes of health, education and nutrition problems, urbanisation, settlement and living problems related to the social dimension. On the other hand, the themes of poverty and hunger and population growth problems were not found in any of the drawings.

Drawing description of the student coded Y-8 (Figure 10):

> "Everyone throws rubbish on the ground that harms animals. They throw chemical wastes, they don't know that they are going to get sick at the end of it and they do not realise the importance of animals. We warn them but they continue to do the same thing. Do not harm anything if you are aware of this."

Figure 10 ***Example of drawing health, education and nutrition problems (Y-8)***

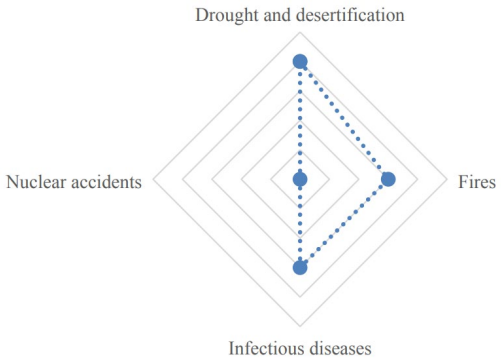
When the drawing coded Y-8 is analysed, it is observed that people pollute their environment, harming nature, people, and animals. The characterisation of fish as 'dead fish' is a result of this situation. It is also noteworthy that the sun and clouds are drawn as unhappy and sick. The fact that the clouds make a coughing sound and their colours are painted green, red, and brown to reflect their diseased states supports awareness of environmental problems that cause health problems. In the drawing, the person on the far left side is also remarkable. The person here is painted yellow; their pupils are larger than usual, in black and red; their shoulders are low; their facial expression is unhappy; and their hands are tied in front of them, as if they were suffering from abdominal pain. All these depictions point to the health problems caused by environmental issues for humans. The other people in the picture appear to be laughing and have a very cheerful, unconcerned attitude, despite throwing trash into the environment.

3.5. Findings Related to the Natural and Human Disasters Dimension

The natural and human-disaster dimension of environmental problems appears less commonly in student drawings. The natural and human disasters dimension includes the sub-themes of fires,

drought and desertification, nuclear accidents, and infectious diseases. The radar graph of the intensity of these sub-themes in the drawings is shown in Figure 11.

Figure 11 The extent to which natural and human disasters sub-theme is included in the drawings



According to Figure 11, the themes of drought and desertification, fires, and infectious diseases in the natural and human disaster dimension were observed with similar frequency in student drawings, whereas drawings related to nuclear accidents were not found in any student drawing.

Drawing description of the student coded O-10 (Figure 12):

> "Factory: factory fumes cause air pollution, but there is a solution. We can prevent it by installing filters. Sound: Car and other vehicle noise causes sound pollution, and the solution is to make less noise. Soil: Some waste is mixed into the soil, causing soil pollution. Recycling bins are used for this. Water: People throw rubbish into the sea, and this causes water pollution. Therefore, we have to adapt people, we have to recycle."

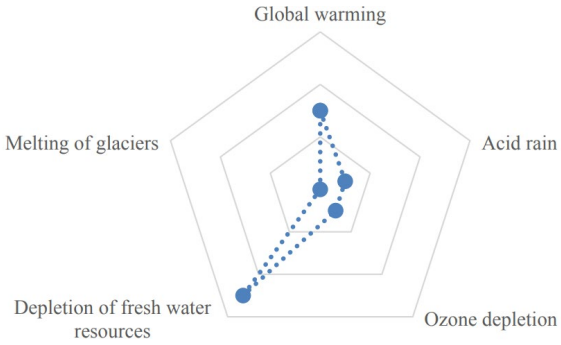
Figure 12 Example of drought-desertification drawing (O-10)

In the drawing coded O-10, it was determined that the student divided the relevant area into four parts and drew a different environmental issue in each part. In the section where the smoke from factories and chimneys, along with the surroundings, is rendered in grey and black tones, air pollution is described. In the section with the drawing of the sound rising from the cars, noise pollution, the section with the garbage thrown on the ground expresses soil pollution. It is evident that the student depicted a brown, plant-free land in the upper-right corner. The presence of a withered tree with only branches left also catches the eye. The student depicts that the land has become infertile and no plant can survive. Therefore, this drawing highlights that the student is aware of the problems of drought and desertification.

3.6. Findings Related to the Climatic Dimension

The climatic dimension of environmental problems appears less frequently as a theme in student drawings. The climatic dimension has sub-themes of global warming, acid rain, glacier melting, ozone depletion, and depletion of freshwater resources. The radar graph of the intensity of these sub-themes in the drawings is shown in Figure 13.

Figure 13 ***The extent to which climatic sub-theme is included in the drawings***



When Figure 13 is analysed, it is evident that students included themes of global warming, acid rain, ozone depletion, and depletion of freshwater resources in their drawings. While it was determined that the theme of freshwater resource depletion was drawn more frequently than other themes, drawings related to melting glaciers were not included in any student drawings.

Drawing description of the student coded D-2 (Figure 14):

> "Smoke from factories, car exhausts, etc., damages the ozone layer."

Figure 14 Example of ozone layer depletion (D-2)

The student who made the drawing coded D-2 is seen to have included a specific region of the Earth in the drawing and described it as a "garbage island" by leaving out a gap in the ocean. The presence of various objects as well as stars in the vacuum of space is another striking feature. The presence of a grey layer surrounding the Earth also draws attention. The student explained this layer as follows: "Smoke from factories, car exhausts, etc. damage the ozone layer." Based on the student's expression and drawing, it was determined that the student was aware of the thinning of the ozone layer. It was seen that the student explained the entities in the drawing with the expressions 'space garbage' and 'garbage island'. Based on these expressions and the drawing, it can be said that the student is aware that sea pollution and air pollution pose a threat to the Earth.

4. Discussion

Many environmental issues affecting our planet have emerged from human behavior. Environmental problems such as global warming, biodiversity loss, environmental pollution, and extreme natural events are just a few examples (Al-Ghussain, 2019; IPCC, 2021; Nerem et al., 2018). It is also humans who need to take action to solve all these problems. For this, environmental awareness must be instilled from an early age. Numerous studies show that as people age, their environmental awareness, interest in nature, and likelihood of forming lasting bonds with nature decrease (Chacko, 1998; Holden, 2007; Neurohr et al., 2023; Otto et al., 2019; Rosa et al., 2018; Spiteri, 2021; Torkar et al., 2020). With this perspective in mind, this study was conducted with 3rd-grade primary school students. Ultimately, in order to eliminate problems, it is necessary first to identify existing ones and then to implement appropriate interventions (Richardson et al., 2020). In this context, the aim was to identify the perceptions of environmental issues held by 3rd-grade primary school students through their drawings.

When examining the drawings of the participating students, it was observed that they depicted many environmental issues and were detailed. In some drawings, multiple issues, such as air pollution and species extinction, appeared simultaneously. In this respect, the students' drawings were detailed and realistic. Yavuzer (2011) states that in children's drawings during this period, objects and colors are not chosen randomly but are done so in accordance with reality. It is also noted that during this period, each child processes their internal relationship with their environment and its components through their drawings. Based on this, it can be inferred that primary school students hold certain ideas and mental models about environmental issues.

Looking at the environmental problems depicted, it is apparent that the students illustrated realistic, everyday objects in accordance with their developmental stage. According to Coles (1992), a child who draws is a child who thinks. What they draw reflects what they know. Therefore, the drawings in this study reflect the students' ideas about environmental issues, their awareness, and the emotions and imagery these issues evoke. Thus, the students seem to have some knowledge and awareness of environmental issues. However, this knowledge is mostly limited and superficial, focusing on basic types of pollution, waste disposal, and local environmental problems (Banks & Taylor, 2025; Häikiö, 2020). Another finding is that the students believe environmental pollution is always caused by others. The statement from student Y-8, "Everyone throws trash on the ground and harms animals. They dump chemical waste and don't realize that this will make them sick or how important animals are. We warn them, but they keep doing it. If you know this, don't harm anything," supports this idea. The belief that environmental pollution is always caused by others poses a major obstacle to taking sufficient responsibility in solving problems. Similarly, many studies have shown that people who do not see themselves as part of nature tend to be less inclined to take action on environmental issues. Connection with nature plays a significant role in the development of environmentally friendly behaviors (Bezeljak et al., 2023; Otto & Pensini, 2017; Schultz, 2007). Another striking point is that while the students illustrated environmental issues in their drawings, very few offered solutions to these problems. In a similar study, Membiela, Nougueiras, and Suarez (1993) found that students could not grasp solutions such as reuse and recycling for solid waste problems, and were insufficient in taking preventive measures. In the drawing coded O-10, the student wrote, "Factory: factory emissions cause air pollution, and there is a solution for this. We can prevent it by installing filters," indicating that some of the children can establish cause-and-effect relationships. However, in contrast, certain studies have shown that although students may have opinions on solving

environmental problems, they do not reflect much on the underlying causes (Van Harskamp et al., 2024; Wardekker, 2001).

Many speech elements are present in the drawings. These expressions often reflect emotional characteristics, such as in the drawing coded D-3, where a fish is depicted as saying, "Stop throwing things, I'm dying," and indicate that the children empathize with living beings and nature. Similarly, in drawings depicting environmental pollution, crying suns, coughing clouds, unhappy humans, animals, and plants stand out. In parallel, Sadık et al. (2011) also found that children, through their drawings, establish emotional bonds with the environment and express their awareness and the emotions environmental issues evoke in them. Yavuzer (2011, p. 78) also states that children reflect their feelings and thoughts in their drawings by placing themselves in the position of objects, drawing on emotion and intuition, thereby bridging the gap between their own experiences and their illustrations. Likewise, numerous other studies emphasize that emotions play a role in creating awareness and values (Block et al., 2019; Manni et al., 2017).

While some environmental issues were commonly illustrated in the student drawings, others were rarely depicted or not depicted at all. The most commonly illustrated environmental issue was "environmental pollution." This outcome is thought to be related to the children's limited experiences with nature (Clayton et al., 2017). In a similar finding, Littledyke (2004) concluded that children generally perceive environmental issues as littering. The reason for this may be the unpleasant appearance of garbage and frequent reminders at home and school to dispose of trash properly. Moreover, regular exposure to air, water, soil, and noise pollution in daily life, along with the negative impacts of urban living, may contribute to heightened awareness of these types of pollution. It is also believed that the children's experiences of city life and their disconnection from nature are reflected in their drawings. Ultimately, experiences in nature influence environmental actions and awareness (Cagle, 2018; Chawla, 2020; Krapp, 2002; Nisbet et al., 2009). Similarly, Koraş (2019) found that students had greater knowledge of and opinions about local environmental issues in their living areas. On the other hand, the students rarely included global environmental problems in their drawings. For example, the issue of "decreasing freshwater sources" was mostly observed in drawings by students with high attitude levels. The problem of "melting glaciers" was not illustrated at all. It is thought that these issues, being global rather than local, are not commonly encountered in everyday life, are shaped over the long term, and are thus difficult to observe, which may explain their absence in the drawings. Indeed, Şahin (2022) also found that students had greater awareness and ideas about their immediate surroundings, likely due to more opportunities to observe their local environments compared to the global environment. The environmental objectives in the primary school curriculum may also play a role in this situation (Fraser et al., 2015; Price et al., 2019). The following learning objectives in the 3rd-grade curriculum may have led students to create more drawings about environmental pollution:

- Actively takes part in keeping their environment clean,
- Discusses the environmental damage caused by battery waste and what should be done about it (MoNE, 2018b).
- Takes responsibility for protecting nature and the environment,
- Gives examples of how recycling benefits both themselves and their environment (MoNE, 2018a).

Indeed, the fact that none of the learning outcomes related to visual/light pollution introduced starting in 4th grade (MoNE, 2018b) appeared in the student drawings or expressions supports this

assumption. Similarly, due to the content of the primary school curriculum, the students may have limited knowledge about environmental issues such as “nuclear accidents” or “drought.” Studies indicate that environmental education increases knowledge and awareness and affects environmental behavior (Fraser et al., 2015; Price et al., 2019).

Alım (2006) states that the content of environmental topics in the curriculum should be revised and expanded. Similarly, Pala (2024) emphasizes that effective environmental education programs can lead to changes in students' lives. Environmental education and being immersed in nature foster positive environmental behaviors and actions (Braun & Dierkes, 2017; Kaiser et al., 2008; Liefländer & Bogner, 2014). Based on this, it is possible to raise conscious generations through education; individuals who are aware of their environment, feel like a part of nature, possess green skills, and seek solutions to environmental problems. Education plays a key role in addressing environmental issues and preventing environmental threats from becoming disasters.

In summary, when students’ drawings are examined by their levels of environmental attitudes, certain similarities emerge among the high-, medium-, and low-attitude groups. Students in the high-attitude group tend to draw more detailed interpretations and representations of the environment, while students in the low-attitude group focus on common themes. However, despite these tendencies, common themes among the three groups suggest that they may be shaped by similar living environments and similar environmental stimuli. This finding supports the view that early environmental awareness is influenced by emotional tendencies, living culture, and school education.

4.1. Limitations and Future Directions

The present study is limited to the drawings of 30 students enrolled in the 3rd grade of primary school. The students’ awareness of environmental issues was evaluated solely on the basis of their drawings.

5. Conclusion

As a result of the study, it was observed that the students often depicted multiple environmental problems in a single drawing and that their illustrations and explanations were detailed. It was clearly evident from the drawings and accompanying narratives that the students felt unhappy about environmental issues. In the student drawings, some environmental problems were depicted extensively, while others were only partially represented or not illustrated at all. Based on this, it can be stated that the students possess a certain level of knowledge and awareness about environmental issues. However, this knowledge mostly pertains to environmental problems that are observable in their immediate surroundings, frequently encountered, and generally considered superficial. Furthermore, many students believed that others polluted the environment, which appeared to lead to a passive attitude toward solving environmental problems. In contrast, albeit rarely, some students not only expressed discomfort with environmental issues but also proposed solutions to address them.

Therefore, it is evident that the curriculum needs to be reviewed and redesigned to ensure that students acquire holistic environmental awareness. In this regard, the curriculum should include visual representations of global environmental problems to attract students’ visual attention and enhance their knowledge; practical and theoretical knowledge should be fostered through a combination of drawing, storytelling, and drama; and activities should be designed to raise awareness of local and global environmental issues. The present study demonstrates that environmental education from the very first stage of schooling is crucial for raising environmentally conscious children. The findings once again highlight the importance of guiding children from an early

age to understand and appreciate nature and the environment, develop a sense of environmental responsibility, feel like part of nature, and adopt the principles of sustainability.

6. Declarations

6.1. Author Contributions (CRediT)

Author 1 (Tansu Kahvecioğlu): Conceptualization; Methodology; Investigation; Data curation; Formal analysis; Writing – original draft; Writing – review & editing; Visualization.

Author 2 (Ayşenur Gündüz): Conceptualization; Methodology; Validation; Supervision; Project administration; Writing – review & editing.

6.2. Conflict of Interest

The authors declare that they have no known competing financial interests, institutional affiliations, or personal relationships that could have appeared to influence the work reported in this paper.

6.3. Funding Statement

This research received no external funding.

6.4. Data Availability Statement

Data are available from the corresponding author upon reasonable request.

6.5. Ethics Approval

Ethics committee approval was obtained from Erciyes University Social and Human Sciences Ethics Committee. Permission for the research application was obtained from the Kayseri Provincial Directorate of National Education. Parental consent forms were obtained from all participants.

6.6. Use of Artificial Intelligence (AI) Tools

None

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References

Akkaş Şahin, B. (2021). *Investigation of environmental perceptions and awareness of primary school 3rd grade students and 4th grade students* [Unpublished master's thesis]. Zonguldak Bülent Ecevit University.

Al-Ghussain, L. (2019). Global warming: Review on driving forces and mitigation. *Environmental Progress & Sustainable Energy*, *38*, 13–21. https://doi.org/10.1002/ep.13041

Alım, M. (2006). Environment and environmental education in primary school in Turkey within the process of the membership of European Union. *Kastamonu Education Journal*, *14*(2), 599–616.

Artvinli, E., & Demir, Z. M. (2018). A study of developing an environmental attitude scale for primary school students. *Journal of Education in Science, Environment and Health*, *4*(1), 32–45.

Atasoy, E. (2005). *Environmental education: A study for elementary school students' environmental attitude and knowledge* [Unpublished doctoral dissertation]. Uludağ University.

Atasoy, E. (2015). *İnsan-doğa etkileşimi ve çevre için eğitim* [*Human-nature interaction and education for the environment*]. Sentez.

Ayvacı, H. Ş., & Çoruhlu, T. Ş. (2009). Öğrencilerin küresel çevre sorunlarına bakışları ve kavram yanılgılarının belirlenmesine yönelik gelişimsel bir araştırma [A developmental study on students' views on global environmental problems and the identification of their misconceptions]. *HAYEF Journal of Education*, *2*(12), 11–25.

Ayvaz, Z., Öztürk, M., Balcı, A., Uzunoğlu, S., Noyan, Ö. F., Pazarlıoğlu, M. V., & Bakaç, M. (1999). *Okul öncesi çevre eğitimi* [*Preschool environmental education*]. İzmir Çevre Eğitimi ve Araştırma Vakfı (ÇEV-KOR). [tüm yazarlar listelenmeli — doğrulanmalı]

Bal, H. (2016). *Nitel araştırma yöntem ve teknikleri* [*Qualitative research methods and techniques*]. Sentez.

Balkan Kıyıcı, F. (2009). Çevre eğitimi [Environmental education]. In V. Sevinç (Ed.), *Eğitim fakülteleri için genel çevre bilimi* [*General environmental science for education faculties*] (pp. 173–183). Maya Akademi.

Banks, K. I., & Taylor, C. A. (2025). Climate change education in primary schools: Using arts-based methods to access student voice and examine the English National Curriculum. *Environmental Education Research*, 1–21. https://doi.org/10.1080/13504622.2025.2460718

Barraza, L. (1999). Children's drawings about the environment. *Environmental Education Research*, *5*(1), 49–66. https://doi.org/10.1080/1350462990050103

Bezeljak, P., Torkar, G., & Möller, A. (2023). Understanding Austrian middle school students' connectedness with nature. *The Journal of Environmental Education*, *54*(3), 181–198. https://doi.org/10.1080/00958964.2023.2188577

Block, T., Van Poeck, K., & Östman, L. (2019). Tackling wicked problems in teaching and learning: Sustainability issues as knowledge, ethical and political challenges. In K. Van Poeck, L. Östman, & J. Öhman (Eds.), *Sustainable development teaching* (pp. 28–39). Routledge.

Braun, T., & Dierkes, P. (2017). Connecting students to nature—How intensity of nature experience and student age influence the success of outdoor education programs. *Environmental Education Research*, *23*(7), 937–949. https://doi.org/10.1080/13504622.2016.1214866

Büyüköztürk, Ş., Kılıç Çakmak, E., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2018). *Bilimsel araştırma yöntemleri* [*Scientific research methods*]. Pegem Akademi.

Cagle, N. L. (2017). Changes in experiences with nature through the lives of environmentally committed university faculty. *Environmental Education Research*, *24*(6), 889–898. https://doi.org/10.1080/13504622.2017.1342116

Chambers, D. W. (1983). Stereotypic images of the scientist: The Draw-A-Scientist Test. *Science Education*, *67*(2), 255–265. https://doi.org/10.1002/sce.3730670213

Chawla, L. (2009). Growing up green: Becoming an agent of care for the natural world. *The Journal of Developmental Processes*, *4*(1), 6–23.

Chawla, L. (2020). Childhood nature connection and constructive hope: A review of research on connecting with nature and coping with environmental loss. *People and Nature*, *2*(3), 619–642. https://doi.org/10.1002/pan3.10128

Clayton, S., Colléony, A., Conversy, P., Maclouf, E., Martin, L., Torres, A. C., Truong, M. X., & Prévot, A.-C. (2017). Transformation of experience: Toward a new relationship with nature. *Conservation Letters*, *10*(5), 645–651. https://doi.org/10.1111/conl.12337

Coles, K. (1992). *The one right touch*. Ahsahta Press.

Collado, S., Staats, H., & Corraliza, J. A. (2013). Experiencing nature in children's summer camps: Affective, cognitive and behavioural consequences. *Journal of Environmental Psychology*, *33*, 37–44.

Creswell, J. W. (2018). *Nitel araştırma yöntemleri* [*Qualitative research methods*] (M. Bütün & S. B. Demir, Eds.). Siyasal Kitabevi. (Original work published year — tamamlanmalı)

Creswell, J. W. (2021). *A concise introduction to mixed methods research*. Sage.

Çüçen, A. K. (2015). *Klasik mantık* [*Classical logic*]. Sentez.

Fraser, J., Gupta, R., & Krasny, M. E. (2015). Practitioners' perspectives on the purpose of environmental education. *Environmental Education Research*, *21*(5), 777–800. https://doi.org/10.1080/13504622.2014.933777

Grodzińska-Jurczak, M., Stepska, A., Nieszporek, K., & Bryda, G. (2006). Perception of environmental problems among pre-school children in Poland. *International Research in Geographical and Environmental Education*, *15*(1), 62–76. https://doi.org/10.2167/irgee187.0

Gülay Ogelman, 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.

Häikiö, T. K. (2020). Aesthetic learning processes in early childhood and early years education: Reflections on educating for sustainable development and use of visual tools and materials. *Techne Serien: Forskning i Slöjdpedagogik og Slöjdvetenskap*, *27*(2), 15–30.

Hazır Bıkmaz, F., & Akben, S. N. (2017). *İlköğretimde çevre eğitimi* [*Environmental education in primary school*]. Türkiye Çevre Vakfı.

Holden, C. (2007). Young people's concerns. In D. Hicks & C. Holden (Eds.), *Teaching the global dimension* (pp. 49–60). Routledge.

Husserl, E. (2012). *Ideas: General introduction to pure phenomenology*. Routledge. (Original work published year — tamamlanmalı)

Kamaruddin, S. M., Ahmad, P., & Alwee, N. (2016). Community awareness on environmental management through Local Agenda 21 (LA21). *Procedia – Social and Behavioral Sciences*, *222*, 729–737. https://doi.org/10.1016/j.sbspro.2016.05.234

Kışoğlu, M., Yıldırım, T., Salman, M., & Sülün, A. (2016). Investigation of behaviors towards environmental problems in teacher candidates who will give environmental education at primary and secondary schools. *Erzincan University Journal of Education Faculty*, *18*(1), 299–318. https://doi.org/10.17556/jef.93507

Kitzinger, J. (1995). Qualitative research: Introducing focus groups. *BMJ*, *311*(7000), 299–302.

Koraş, M. (2019). *Determination of secondary school students' perceptions of environmental problems through drawings* [Unpublished master's thesis]. Necmettin Erbakan University.

Krapp, A. (2002). Structural and dynamic aspects of interest development: Theoretical considerations from an ontogenetic perspective. *Learning and Instruction*, *12*(4), 383–409. https://doi.org/10.1016/S0959-4752(01)00011-1

Kuzu, T. (2008). Aytül Akal'ın masallarıyla çocukta çevre bilinci geliştirme [Developing environmental awareness in children through Aytül Akal's fairy tales]. *The Journal of Selçuk University Social Sciences Institute*, (19), 327–339.

Kvale, S. (1994). *Interviews: An introduction to qualitative research interviewing*. Sage.

Liefländer, A. K., & Bogner, F. X. (2018). Educational impact on the relationship of environmental knowledge and attitudes. *Environmental Education Research*, *24*(4), 611–624. https://doi.org/10.1080/13504622.2016.1188265

Littledyke, M. (2004). Primary children's views on science and environmental issues: Examples of environmental cognitive and moral development. *Environmental Education Research*, *10*(2), 217–235. https://doi.org/10.1080/1350462042000198186

Mackay, C. M. L., & Schmitt, M. T. (2019). Do people who feel connected to nature do more to protect it? A meta-analysis. *Journal of Environmental Psychology*, *65*, 101323.

Manni, A., Sporre, K., & Ottander, C. (2016). Emotions and values—A case study of meaning-making in ESE. *Environmental Education Research*, *23*(4), 451–464. https://doi.org/10.1080/13504622.2016.1175549

Membiela, P., Nogueiras, E., & Suárez, M. (1993). Students' preconceptions about urban environmental problems and solid waste. *The Journal of Environmental Education*, *24*(2), 30–34. https://doi.org/10.1080/00958964.1993.10801972

Merewether, J., Blaise, M., Pitchford, K., & Giamminuti, S. (2023). Unsettling "reduce-reuse-recycle": The provocation of wastepaper and "discarding well." *The Journal of Environmental Education*, *54*(3), 199–212. https://doi.org/10.1080/00958964.2023.2179585

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Sage.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook*. Sage.

Millî Eğitim Bakanlığı. (2018a). *Hayat bilgisi dersi öğretim programı (İlkokul 1, 2 ve 3. sınıflar)* [Life studies course curriculum (primary school grades 1, 2 and 3)]. http://mufredat.meb.gov.tr/Programlar.aspx

Millî Eğitim Bakanlığı. (2018b). *Fen bilimleri dersi öğretim programı (İlkokul ve ortaokul 3, 4, 5, 6, 7 ve 8. sınıflar)* [Science course curriculum (primary and middle school grades 3–8)]. http://mufredat.meb.gov.tr/Programlar.aspx

Nerem, R. S., Beckley, B. D., Fasullo, J. T., Hamlington, B. D., Masters, D., & Mitchum, G. T. (2018). Climate-change–driven accelerated sea-level rise detected in the altimeter era. *Proceedings of the National Academy of Sciences*, *115*(9), 2022–2025. https://doi.org/10.1073/pnas.1717312115

Neurohr, A. L., Pasch, N., Bergmann-Gering, A., & Möller, A. (2024). Linking students' interest in nature to their self-reported pro-environmental behavior and nature activities: A cross-sectional study in grade 5 to 9. *The Journal of Environmental Education*, *55*(6), 460–479. https://doi.org/10.1080/00958964.2024.2364182

Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2009). The Nature Relatedness Scale: Linking individuals' connection with nature to environmental concern and behavior. *Environment and Behavior*, *41*(5), 715–740. https://doi.org/10.1177/0013916508318748

Otto, S., Evans, G. W., Moon, M. J., & Kaiser, F. G. (2019). The development of children's environmental attitude and behavior. *Global Environmental Change*, *58*, 101947.

Otto, S., & Pensini, P. (2017). Nature-based environmental education of children: Environmental knowledge and connectedness to nature, together, are related to ecological behaviour. *Global Environmental Change*, *47*, 88–94. https://doi.org/10.1016/j.gloenvcha.2017.09.009

Pala, F. (2024). A study on the perceptions of Turkish primary school students regarding the environment, climate change, and sustainability. *The Journal of Environmental Education*, *56*(1), 49–64. https://doi.org/10.1080/00958964.2024.2427063

Patton, M. Q. (2014). *Nitel araştırma ve değerlendirme yöntemleri* [*Qualitative research and evaluation methods*] (M. Bütün & S. B. Demir, Eds.). Pegem Akademi. (Original work published year — tamamlanmalı)

Pınar, E. (2019). *Perception of primary school students about environment and environmental problems* [Unpublished master's thesis]. Ondokuz Mayıs University.

Pooley, J. A., & O'Connor, M. (2000). Environmental education and attitudes: Emotions and beliefs are what is needed. *Environment and Behavior*, *32*(5), 711–723. https://doi.org/10.1177/0013916500325007

Price, E. A., Vining, J., & Saunders, C. D. (2009). Intrinsic and extrinsic rewards in a nonformal environmental education program. *Zoo Biology*, *28*(5), 361–376. https://doi.org/10.1002/zoo.20183

Richardson, M., Passmore, H. A., Barbett, L., Lumber, R., Thomas, R., & Hunt, A. (2020). The green care code: How nature connectedness and simple activities help explain pro-nature conservation behaviours. *People and Nature*, *2*(3), 821–839. https://doi.org/10.1002/pan3.10117

Rosa, C. D., Profice, C. C., & Collado, S. (2018). Nature experiences and adults' self-reported pro-environmental behaviors: The role of connectedness to nature and childhood nature experiences. *Frontiers in Psychology*, *9*, 1055.

Sadık, F., Çakan, H., & Artut, K. (2011). Analysis of the environmental problems pictures of children from different socio-economical level. *İlköğretim Online*, *10*(3), 1066–1080.

Sethusha, M. J. (2006). *How primary school learners conceptualize the environment and environmental education* [Unpublished doctoral dissertation]. University of Pretoria.

Spiteri, J. (2021). Can you hear me? Young children's understanding of environmental issues. *International Studies in Sociology of Education*, *30*(1–2), 191–213. https://doi.org/10.1080/09620214.2020.1859401

Şahin, B. N. (2022). *The analysis of the middle school 6th grade students' near environment awareness: The sample of Kayseri province* [Unpublished master's thesis]. Erciyes University.

Tan, E., & So, H. J. (2018). Role of environmental interaction in interdisciplinary thinking: From knowledge resources perspectives. *The Journal of Environmental Education*, *50*(2), 113–130. https://doi.org/10.1080/00958964.2018.1531280

Torkar, G., Debevec, V., Johnson, B., & Manoli, C. C. (2021). Assessing children's environmental worldviews and concerns. *Center for Educational Policy Studies Journal*, *11*(1), 49–65. https://doi.org/10.26529/cepsj.793

UNICEF. (2022). *UNICEF DRR in action: Every country protected. Every child resilient*. https://www.unicef.org/documents/unicef-drr-action-every-country-protected-every-child-resilient

United Nations. (2007). *World urbanization prospects: The 2007 revision highlights*. Department of Economic and Social Affairs.

United Nations. (2011). *World urbanization prospects: The 2011 revision highlights*. Department of Economic and Social Affairs.

van Harskamp, M., Knippels, M. C., & van Joolingen, W. (2024). Environmental citizenship: Dutch students' sustainability competences and avenues for science education. *The Journal of Environmental Education*, *55*(4), 267–288. https://doi.org/10.1080/00958964.2024.2306160

Wardekker, W. L. (2001). Schools and moral education: Conformism or autonomy? *Journal of Philosophy of Education*, *35*(1), 101–114. https://doi.org/10.1111/1467-9752.00212

Yavuzer, H. (2011). *Resimleriyle çocuk: Resimleriyle çocuğu tanıma* [*The child through drawings: Understanding the child through drawings*]. Remzi Kitabevi.

Yıldırım, A., & Şimşek, H. (2016). *Sosyal bilimlerde nitel araştırma yöntemleri* [*Qualitative research methods in social sciences*]. Seçkin.