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Enhancing Young Children's Perceptions of Environment: Evidence from Forest School Experiences

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Enhancing Young Children's Perceptions of Environment: Evidence from Forest School Experiences

Abstract:
Experiences in natural outdoor environments are considered an important context for developing children's environmental awareness and perceptions of nature. Establishing a meaningful relationship between children's knowledge of nature and real-life experiences requires appropriate planning and environments. This study aims to investigate the effect of a forest school activity program on the diversity of natural elements in children's forest-themed drawings and their verbal expressions. In studies using children's drawings, it is recommended that visual data be interpreted together with children's verbal explanations in order to avoid researcher misinterpretation. A phenomenological design was employed, and the study group consisted of 30 children from a public kindergarten in Kutahya in Türkiye during the 2022–2023 academic year. The experimental group participated in forest school activities for 10 weeks, while the control group followed the standard preschool program. Data were collected through analysis of children's drawings and their verbal descriptions of forest experiences. The analysis focused on identifying recurring visual and narrative patterns that reflected children's perceptions of the forest environment. The results indicate that forest school activities significantly enrich children's nature-related expressions and representations. It is suggested that such programs be included in early childhood education to foster deeper connections with nature.

Keywords:
Forest school, outdoor learning, early childhood education, preschool, children's drawings

1. Introduction

Forest School practices provide children with opportunities to engage directly with natural environments and develop meaningful relationships with nature. Increasing attention has been given to nature-based learning in early childhood education due to its contributions to holistic development and environmental awareness (Chawla, 2020; Chawla & Derr, 2012; Kellert, 2002; Wells & Lekies, 2006). However, modern lifestyles and urbanization have reduced children's opportunities to interact with nature, emphasizing the need for integrating nature-based experiences into educational settings (Louv, 2005).

Originating in Scandinavia, Forest School programs offer child-centered, experiential learning in natural environments (Cree & McCree, 2012; Knight, 2013). Research shows that these experiences support children's self-confidence, problem-solving, social development, and engagement with learning while fostering curiosity and exploration (Cumming & Nash, 2015; Leather, 2013; Maynard et al., 2013; O'Brien & Murray, 2007; Swarbrick et al., 2004;).

Recent studies highlight the role of nature-based education in strengthening children's connection to nature, which is crucial for developing environmental responsibility (Barrable & Booth, 2020; Otto & Pensini, 2017). Yet, implementing such practices in diverse educational contexts poses challenges, including balancing safety, academic readiness, and free play, underscoring the need for culturally responsive adaptations and teacher training (Ahi, Kaya & Kahriman Pamuk, 2023; Buldur, 2023; Yalçın & Tantekin Erden, 2026).

Children's drawings provide valuable insights into their cognitive representations, emotional responses, and perceptions of natural environments (Lewis et al., 1993; Malchiodi, 1998; Özsoy & Ahi, 2014). Analyzing drawings following Forest School experiences can reveal how nature-based practices influence children's understanding of forests and environmental concepts. Drawings also serve as a natural, developmentally appropriate means for children to communicate complex ideas and feelings, particularly when verbal expression is limited.

Forest environments offer rich sensory experiences that stimulate imagination, creativity, and exploratory learning (Cheng & Monroe, 2012; Harris, 2021). Early exposure to nature has been linked to stronger environmental values and pro-environmental behaviors (Hoover, 2021; Larson et al., 2011; UNESCO, 2023). Conversely, limited access to natural environments can lead to misconceptions or fears about nature, highlighting the importance of structured nature-based experiences (Driessnack, 2009; Louv, 2005). Forest-themed drawings provide a meaningful window into children's perceptions and emotional connections with the natural world, making them a valuable tool for examining how children construct meaning from their interactions with nature.

Purpose and Importance of the Research

Although research has examined the educational and developmental benefits of Forest School practices, most studies have focused on children's social development, wellbeing, and environmental attitudes. Outdoor learning environments support children's autonomy, creativity, and emotional development (Cudworth & Tymms, 2024; Harris, 2021), while nature-based education fosters children's connection with nature and promotes pro-environmental behaviors (Hoover, 2021; Larson et al., 2011).

Relatively little attention has been given to how these experiences are reflected in children's artistic expressions and visual representations of nature. Few studies have explored how participation in Forest School activities influences preschool children's drawings and their symbolic depictions of natural environments. Since drawings are an important medium for young children to express perceptions and experiences, analyzing their artwork can provide insights into how nature-based learning shapes their understanding of forests and ecosystems.

This study compares the drawings of children who participated in Forest School activities with those who did not, focusing on object diversity, thematic content, and artistic expression. In doing so, it aims to reveal how direct experiences with nature are reflected in children's visual expressions and contributes to the broader literature on outdoor and nature-based learning in early childhood education.

Therefore, this study aims to contribute to the existing literature by exploring how regular participation in Forest School activities influences preschool children's representations of forests in their drawings. By comparing the drawings of children who participated in Forest School activities with those who did not, this research seeks to reveal how direct interaction with nature is reflected in children's visual expressions and environmental perceptions. In this way, the study contributes to the growing body of research on outdoor learning and provides new insights into the role of nature-based educational environments in supporting children's creative and cognitive development.

The study addresses the following research questions:

1. How do preschool children represent forests and natural elements in their drawings?

2. What differences exist between the drawings of children who participate in Forest School activities and those who do not?

3. How do Forest School experiences influence the diversity of objects, themes and visual representations in children's drawings?

Materials and Methods

Phenomenological design, one of the qualitative research approaches, was used in this study. Qualitative research is a research approach that aims to understand individuals' experiences, the meanings they attribute

to these experiences and the way they perceive the world (Yüksel and Yıldırım, 2015). The main feature of qualitative research is to approach events, phenomena and processes from the perspective of the participants and to try to understand their experiences in depth (Yüksek Usta and Tezel Şahin, 2016). In this context, phenomenology is a design that aims to explain individuals' subjective experiences of a particular experience or phenomenon and the meanings of these experiences (Creswell, 2013).

In the phenomenological research design, the aim is to reveal the essence of these experiences by analyzing individual experiences of a common experience or phenomenon. The phenomenon that this study seeks to explain is preschool children's perceptions of the concept of "forest". The themes reflected in children's drawings are analyzed through symbols and forms of expression. Children's drawings were used as the main data source in this study because they reflect their thoughts about nature, their perception structures and their relationships with the environment (Malchiodi, 1998). Thus, it was aimed to reveal child-ren's perceptions of the forest concept through their drawings. In addition, the use of drawings together with children's verbal explanations enabled a deeper understanding of the meanings attributed to the drawings and contributed to the richness of the qualitative data.

Study Group

Purposive sampling method was used in the study. Purposive sampling is a method that is often preferred in qualitative rese-arch in order to reach a sample suitable for the research purpose. In accordance with the purpose of the study, children studying in pre-school education institutions who were easily accessible and who agreed to participate in the study were included in the study group. The kindergarten was selected because it provided access to children who were participating in a structured forest school activity program and who were willing to participate in the research

The sample of the study consisted of 30 children in the 5–6 age group from a kindergarten in the center of Kutahya province in Türkiye. The children in the study group were divided into two groups of 15 children each and one of the groups was subjected to a 10-week forest school activity program. The forest perceptions of children from the same socio-cultural environment and attending the same school were examined as two separate groups. Children who had parental consent and were willing to participate were included in the research process. The study group consisted of 37% girls and 63% boys.

Prior to the study, written informed consent was obtained from the parents of all participating children. Ethical approval for the study was obtained from the relevant institutional ethics committee, and the research process was conducted in accordance with ethical principles related to voluntary participation, confidentiality and the protection of children's rights.

Data Collection Tool and Collection of Data

Data were collected by having the children draw pictures about a day in the forest and each child was asked to describe the pic-ture they drew. The narratives were recorded by taking notes on the back of the drawings and videotaping. The application was carried out in the classroom of each group under the supervision of their own teacher in order to make the children feel more comfortable. During the data collection process, the researcher acted as a facilitator and avoided directing the children's drawings or explanations. Care was taken to ensure that the questions asked did not lead the children toward a particular response. This approach helped minimize potential researcher influence on the data.

The symbols that the children included in their drawings and the messages they wanted to convey by using these symbols were determined by the researcher by asking the children questions such as "What is this thing you drew?", "What did you want to tell here?", and "What do the people in the picture feel?". The

children's answers were noted on the back of the drawings. These expressions, which the researcher took notes in her own handwriting, are documents and constituted the main data source of the study.

The pictures were analyzed by taking into account the data obtained after the interviews. In accordance with research ethics, instead of the names of the children participating in the study, the pictures were numbered to identify those in the D and K groups, and codes were used as D1, D2, D3… and K1, K2, K3….

The drawing part of the application was completed by the children within approximately 30 minutes. After the drawings were completed, the children were taken to a different area in groups of a few people and their individual narratives were noted. Some of the children's expressions were video recorded and some of the students did not want their expressions to be recorded, so only their expressions were noted without being recorded.

The use of both drawings and children's explanations provided an opportunity to interpret the symbolic meanings of the drawings more accurately. In this way, the combination of visual and verbal data sources contributed to the depth and credibility of the data collected.

Data Analysis

The data obtained in this study were analyzed using the interpretive content analysis method. Content analysis is a method that is frequently used in qualitative research and aims to make sense of data under certain themes and categories by coding them systematically. The basic process is to organize and interpret similar data around certain concepts and themes in a way that the reader can understand (Topkaya, 2013). This type of analysis is not only limited to the description of the data, but also allows new meanings to be derived from the data.

In this study, both children's drawings and their verbal expressions about these drawings were analyzed. The visual elements (natural elements, living creatures, spatial arrangements, etc.) in children's drawings were considered as symbolic indicators; through these symbols, children's mental representations and perceptual structures regarding the concept of forest were tried to be reached. In order to avoid possible misinterpretations of the drawings, children's verbal explanations were used as the primary source for interpreting the visual elements. The meanings attributed to the symbols were therefore based on the children's own descriptions rather than the researcher's assumptions. The theoretical framework provided by interpretive content analysis was guiding in terms of revealing the meanings behind the symbols and expressions in the drawings (Giarelli and Tulman, 2003). In this context, each drawing was evaluated holistically in line with both the visual elements and the child's explanations about this drawing.

In the first stage of the analysis process, all the drawings made by each child were examined separately; only the drawings that contained visually meaningful data and sufficient detail in terms of drawing and expression were evaluated. Based on these selected drawings, children's expressions and the objects, symbols and themes in their drawings were coded. To increase the reliability of the coding process, a second researcher who is experienced in qualitative research independently coded a subset of the drawings and children's narratives. The coding results were compared and discrepancies were discussed until consensus was reached. To enhance the trustworthiness of the study, strategies such as data triangulation, the use of direct quotations, and detailed documentation of the analysis process were employed.

During the coding process, the elements that children included in their drawings (e.g., trees, animals, sun, people, etc.) and the verbal explanations they gave about these elements were analyzed separately. The coded data were then grouped according to their similarity and relationship levels according to their common characteristics and grouped under themes. These themes were presented in tables with their

frequencies within the framework of categories created in accordance with the purpose of the study. Each code was created directly from the children's own statements; thus, the validity of the study was increased (Yıldırım and Şimşek, 2018).

To increase the credibility and transparency of the analysis, the researcher avoided imposing personal interpretations and instead included direct quotations from the children's explanations of their drawings in order to reflect the data as authentically as possible. In addition, the use of both visual data (children's drawings) and verbal explanations provided a form of data triangulation that strengthened the credibility of the findings.

Furthermore, the analysis process was carried out systematically and documented in detail in order to ensure transparency and consistency in the interpretation of the data. In this way, the principles of credibility, transparency and reliability were taken into consideration throughout the analysis process and the influence of the researcher on the interpretation of the data was minimized.

Results

After examining the forest drawings produced by the children, the objects depicted in each drawing were discussed with the participants to clarify their representations. The data collected from these notes were subsequently organized into thematic categories, distinguishing between objects that are part of the forest ecosystem and those that are not. The variety of objects in each drawing was analyzed separately, and the frequency of each object type was presented in a table. Drawings created by children who participated in the forest school activity program were classified as Group D, while drawings by children who did not participate in the program were classified as Group K, and the frequency values for each category were reported separately.

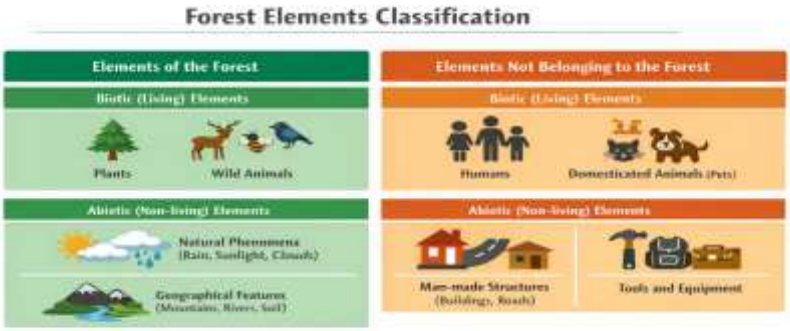
The Figure 1 presents a hierarchical framework for categorizing elements depicted in children's forest drawings. The elements are divided into two primary categories: Elements of the Forest and Elements Not Belonging to the Forest, each further subdivided into Biotic (Living) Elements and Abiotic (Non-living) Elements.

- Elements of the Forest include living components such as plants and wild animals, and non-living components such as natural phenomena (e.g., rain, sunlight, clouds) and geographical features (e.g., mountains, rivers, soil formations).

- Elements Not Belonging to the Forest consist of living components such as humans and domesticated animals (e.g., pets), and non-living components such as man-made structures (e.g., buildings, roads) and tools or equipment.

This classification provides a clear, systematic approach for analyzing the content of children's drawings. It allows for the differentiation between ecologically relevant forest elements and external or imaginative elements, facilitating both qualitative interpretation and quantitative analysis of element frequency and diversity across experimental (forest school participants) and control groups. The diagram supports the investigation of children's perceptions, understanding, and representational skills regarding forest ecosystems.

Figure 1. ***Hierarchical framework for categorizing elements depicted in children's forest drawings***



The analysis of the forest drawings revealed notable differences between children who participated in the forest school activity program (Group D) and those who did not (Group K). After examining each drawing, participants were asked to identify the objects they had depicted, and the resulting data were organized into thematic categories, distinguishing between elements of the forest and elements not belonging to the forest. The variety of objects in each drawing was analyzed separately, and the frequency of each object type was recorded.

Forest Elements were classified as biotic (living) and abiotic (non-living). Biotic elements included plants and wild animals, while abiotic elements comprised natural phenomena (e.g., sunlight, rain, clouds) and geographical features (e.g., mountains, rivers, soil formations). In the drawings from Group D, children frequently depicted detailed representations of trees, including branches and root systems extending below the soil, and a variety of wild animals such as bees, birds, and butterflies. This indicates a heightened awareness of structural and ecological aspects of the forest. In contrast, Group K drawings primarily showed the visible portions of trees with less attention to roots or intricate details, and wild animals were depicted less frequently, suggesting a more superficial representation of forest elements.

Elements not belonging to the forest included biotic elements, such as humans and domesticated animals, and abiotic elements, including man-made structures, tools, and equipment. In Group D, some children integrated human figures into their drawings, for example a father and child spending time in the forest, reflecting an understanding of the forest as a space where humans interact with and experience nature. Group K drawings also included such elements, but less consistently. Occasionally, children in both groups included imaginative or unrelated elements, such as UFOs, further illustrating varying degrees of attention to realistic forest components.

The frequency of objects in each category was tabulated, highlighting differences between the groups. Group D drawings demonstrated greater diversity and complexity in representing both biotic and abiotic forest elements, while Group K drawings tended to focus on superficial and easily recognizable aspects. These findings suggest that participation in the forest school program enhanced children's observational skills and their ability to integrate ecological knowledge into visual representations of natural environments.

Table 1 summarizes the biotic elements of the forest identified in the students' drawings. The distribution and diversity of these elements were examined by comparing the experimental and control groups. This analysis aims to highlight differences in how living components of the forest ecosystem were represented.

Table 1 Biotic elements (Plant / Wild Animal)

When the biotic element drawings of the forest in Table 1 are analyzed, there are differences between the experimental and control groups in terms of object diversity. In the plant drawings, there were 43 objects in the experimental group and 23 objects in the control group that were clearly drawn and expressed as plant types. It was observed that the expressions of "dried trees, cones, roots, tree roots and tree barks" drawn by the children in the experimental group in their drawings included the expressions in the activities in the forest school program prepared by the researcher. When the wild animal object drawing variety was analyzed, it was seen that there were 37 objects drawn in the experimental group and 12 objects drawn in the control group.

In the drawings from the experimental group, particularly in examples 15D and 8D, participants depicted not only the visible portions of trees but also the branches and root systems, including the parts located beneath the soil surface. This approach demonstrates a more comprehensive and detailed representation of trees, reflecting an awareness of both above-ground and below-ground structures. By illustrating roots and subterranean elements, participants engaged in a deeper observational process, capturing aspects of plant anatomy that are typically less visible in everyday perception. Such detailed depictions suggest that the experimental group was more attentive to the structural and functional characteristics of trees, indicating an enhanced understanding of natural forms and an ability to translate this knowledge into visual representations. This contrasts with more superficial representations, highlighting the experimental group's capacity for integrating ecological and botanical knowledge into their drawings.





In the drawings from the control group, particularly in examples 9K and 14K, participants primarily focused on representing the overall forms and visible portions of trees rather than their intricate details. The depictions emphasized the general shape and structure of trees, capturing differences in size, height, and overall appearance, rather than botanical or textural features such as bark patterns, leaf arrangements, or branch structures. This suggests that participants in the control group were more attentive to the perceptual and outwardly observable characteristics of trees rather than engaging in detailed observational or analytical representation. Such a pattern may reflect a more superficial or global approach to nature representation, highlighting the tendency to prioritize easily recognizable visual cues over more nuanced naturalistic details.




Table 2 summarizes the abiotic elements of the forest represented in the drawings, grouped under the categories of natural phenomena and geographical shapes. The frequencies of these elements were compared between the experimental and control groups. This comparison provides insight into how students conceptualized and represented the abiotic components of the forest environment.

Table 2 A biotic elements (Natural phenomena / Geographical forms)

The abiotic elements of the forest in Table 2 were grouped under the sub-headings of "Natural phenomena" and "Geographical shapes". When the pictures in which the objects related to natural phenomena were clearly drawn and expressed are examined, it is seen that there were 34 object drawings in the experimental group and 24 object drawings in the control group. It is seen that both groups included drawings of objects that appeal to our sense of sight, but the experimental group also included the wind object whose existence they felt. When the theme of geographical shapes was examined, it was seen that similar drawings were included, but the experimental group included the underground theme in the drawings, which was included in the forest school activities.




When the pictures coded 4D and 13D in the experimental group were analyzed, it was observed that the first picture included drawings of underground creatures and tree roots, while the second picture depicted a giraffe attempting to eat the leaves of a tree and branches bending to the other side due to the blowing wind.



In the control group, the picture coded 4K illustrated a forest located by the sea, whereas the picture coded 13K represented a forest scene at night.

Table 3 presents the non-forest elements identified in the students' paintings. These elements were categorized under the main themes of biotic and abiotic, and their distribution was compared between the experimental and control groups.

Table 3 Non-Forest Biotic Elements

In Table 3, the non-forest elements in the paintings were analyzed and categorized under two main themes: biotic and abiotic. Living elements were analyzed as human and pet themes. While the number of objects in the drawings with human figures was 5 in the experimental group, there were 24 drawings representing human figures in the control group. In the pet category, there were 5 pet drawings in the experimental group and 3 pet drawings in the control group.



In the experimental group, the drawings 5D and 7D included human figures, which are elements not typically considered part of the forest ecosystem, such as a father and child spending time in the forest. These depictions indicate that participants integrated human presence into their representations of natural environments, reflecting an understanding of the forest as a space where humans interact with and experience nature. The inclusion of human figures suggests a broader conceptualization of the forest, encompassing not only flora and fauna but also human activities and relationships within this ecosystem. This approach highlights the experimental group's ability to perceive and depict ecological and social interactions, demonstrating a more complex and contextually rich representation of the natural environment compared to representations that focus solely on trees and wildlife.





The pictures in the control group 5K and 12K, in which human figures not belonging to the forest were drawn, included people spending time in the forest (Mother, Friend, Father, Child, Sibling, Teacher).





In the drawings coded 12D and 6D in the experimental group, scenes related to the *risk hunt* and *tent-building* activities conducted as part of the forest school program were depicted, indicating that the students reflected the activities they experienced during the program in their drawings.





Analysis of the drawings coded 6K and 15K in the control group revealed the inclusion of non-forest elements, such as a treehouse, swing, bird's nest, and train track, suggesting that students in the control group incorporated familiar or recreational features rather than strictly forest-related elements.

Table 4 presents the abiotic elements identified in the students' drawings. These elements were categorized into the sub-themes of structures, tools and equipment, and other. The distribution of these elements was compared between the experimental and control groups to examine differences in how non-living components were represented.

Table 4 Non-Forest Abiotic Elements

The abiotic elements in Table 4 were evaluated by dividing them into sub-themes as structure, tools and equipment and other. In the structure category, 9 object types were drawn in the experimental and control groups. In the equipment category, 11 types of objects were drawn in the experimental group and 16 types of objects were drawn in the control group. The drawings in the drawings that were not thought to represent any theme were evaluated as uncategorized. Although the drawings evaluated as uncategorized were not elements belonging to the forest, it is known that the drawings in the experimental group, including the expression of the protection of the forest, flag, danger sign, fire, fire protection, are known to be the expressions included in the activities planned in the forest school program.





Analysis of the drawings 7D and 7K, which included similar objects in the experimental and control groups under the 'other' category, revealed that both depicted a fire. In the experimental group, the drawing also included fire protection measures beneath the fire, reflecting one of the rules emphasized in the forest school activities.

The following are the children's verbal expressions corresponding to their forest drawings. Statements coded D1, D2, D3, etc., represent the experimental group, whereas statements coded K1, K2, K3, etc., represent the control group.D1: "We live in the forest, we have a house there... The forest loves us."

D2: ". There are many animals in the forest. They live happily, people do not disturb them."

D3: "...Some animals were hidden. There were also animals hiding under the ground..."

D4: "...We look at how far the roots of the trees go. They have very long roots."

D5: "...We were looking at the birds in the forest, the birds flew away when they saw us..."

D6: "We went to the forest in the village."

D7: "We had a picnic in the forest where we looked for mushrooms."

D8: "...Animals hide in the forest, they don't bother us."

D9: "...we do not harm the animals around."

D10: " ...The giraffe is looking at us through the trees..."

D11: "Giraffe wandering in the forest...fireflies followed the giraffe..."

D12: "...We brought saplings with us, to increase the forest..."

D13: “...It was very hot in the forest, but the giraffe cooled off when the wind blew...”

D14: “...There is a rainbow, animals are watching the rainbow from behind themountains...”

D15: “We are in the forest where it is quiet and there is no danger...”

K1:” We are camping in the forest with my father...”

P2: “My mom and I are swimming in the sea...”

P3: “We came to the forest...”

P4: “ ...In the jungle, gorillas climb trees... There is a waterfall, dolphins swim in the waterfall...”

P5: “ ...There are conifer trees, grass...”

P6: “I walk in the forest, I look at the height of the trees.”

P7: “I try to survive in the forest.”

P8: “I love the forest very much.”

P9: “There is a beautiful lake in the forest”

P10: “We are in the forest... There is a river and the water is flowing...”

P11: “We are in the forest with Ahmet...”

P12: “...The waterfall flows into the sea...”

P13: “ ...it is evening...

P14: “I went to the forest with my father...”

P15: “...We went to the forest by train...”

Below, the expressions of the children in the drawings that do not belong to the forest are given. Statements coded D1,D2,D3... are the statements of the children in the experimental group and statements coded K1,K2,K3... are the statements of the children in the control group.

D1: “Our school is in the forest, I ride my bike to school, the forest protects us...”

D2:” I made small houses for the animals so they can sleep comfortably...”

D3: “...There were animals hiding under the ground, we didn’t harm them while barbecuing...”

D4: “We are exploring in the forest with my father...”

D5: “Go to the forest and swing with my father...”

D6: “I play in the water, I play in the mud, Aunt Ayşe is also there.”

D7: “We have a picnic in the forest where we look for mushrooms...”

D8: “We set up a tent...”

D9: “We didn’t throw our garbage around, we put it in a bag, we will throw it when we go inside the tent, we sleep in the tent.”

D10: “The giraffe was looking at us through the trees, he didn’t bother us and we didn’t bother him”

D11: “ ...I gave him a banana, the snail comes to eat the banana first...”

D12: “We marked the dangerous areas so that others would see the danger sign and pay attention...”

D13: “When the wind blew, it was cool, the leaves of the tree went to the other side...”

D14: “People did not disturb the animals in the forest.”

D15: “We are in the forest where it is quiet and there is no danger. The animals are very happy, they are racing...”

P1: “We set up a tent, made a fire, we sit...”

P2: “My mom and I are swimming in the sea...”

P3: “We have a house in the forest, we barbecue.”

P4: “We made a campfire... We make marshmallows on the fire... My father has it...”

P5: “I camp in the forest...”

P6: “I’m traveling...”

P7: “I am trying to survive...”

P8: “We set up a swing, I am swinging in the forest...”

P9: “ ...We made a tree house...”

P10: “My mom, aunt and I had a picnic, we had a barbecue...”

P11: “We are camping in the forest with Ahmet...”

P12: “My father barbecues, I set up a tent...”

P13: “We barbecue with my father. They built a small hut...”

P14: “We play ball in the forest.”

P15: “...we set up a tent, I ride the swings...”

Discussion, Conclusion, Recommendations

This study aimed to examine the effects of the Forest School program on preschool children’s behavioral and skill development through their forest-themed drawings. By analyzing children’s drawings and their verbal descriptions, the study explored how children perceive and express nature-related concepts. Children

were encouraged to create expressive and understandable forest-themed drawings based on what they saw or imagined in nature. Their drawings were supported by their own narratives, and each meaningful element was coded accordingly. These visual expressions provided valuable insight into how children conceptualize nature.

The findings revealed that both groups those who participated in Forest School activities and those who did not depicted nature elements like trees, vegetation, and the sky. However, children in the experimental group illustrated trees in greater detail, including roots and branches. More notably, they used environmental awareness expressions such as "without harming the tree" or "without disturbing the animals." These details suggest that Forest School activities foster a deeper and more sensitive understanding of nature (Borradaile 2006; Ridgers, Knowles and Sayers 2012). In contrast, the control group tended to represent trees more simplistically, with trunks and leaves, often depicting trees as functional objects like swing stands or treehouses, separate from the forest context.

Both groups included drawings of fire; however, children in the experimental group demonstrated awareness of fire safety practices, such as surrounding fire with stones to avoid direct contact with the soil. These illustrations reflect the fire safety and environmental protection principles taught during Forest School activities (Blackwell 2015; Harris 2021). The use of specific natural materials in their drawings shows that experiential learning had an observable impact on their understanding and behavior.

The results affirm that early childhood interactions with nature play a critical role in shaping lifelong environmental attitudes and behaviors. The literature similarly highlights the importance of establishing a bond with nature during the early years in fostering environmentally conscious individuals (Başbay and Atmaca 2022; Nawaz and Blackwell 2014).

These findings are consistent with national and international research. For example, Blackwell (2015) noted that Forest School participation increased children's environmental awareness and learning motivation. O'Brien and Murray (2007) reported that children's cognitive development, cooperation skills, and environmental sensitivity improved significantly after engaging in Forest School programs. Similarly, studies by Kahriman-Pamuk and Ahi (2019) showed that forest-based learning environments enhanced children's emotional development and attitudes toward nature.

In the study conducted by Turtle, Convery, and Convery (2015), children who attended Forest School programs developed more positive environmental attitudes and closer connections to nature. Drawings from the experimental group in the current study reflect environmental awareness and responsibility, such as avoiding harm to nature, which suggests that direct, immersive nature experiences support the development of lasting pro-environmental behaviors.

Research by Cumming and Nash (2015) and Elliot and Krusekopf (2018) also confirms that children form stronger emotional bonds with nature when they spend regular time outdoors. In line with this, our study found that children in the experimental group included more diverse and detailed natural elements in their drawings, indicating that hands-on experiences reinforce both emotional and cognitive connections with nature.

In conclusion, the Forest School approach proves to be effective in fostering positive environmental attitudes during early childhood. These findings align with nature-based environmental education studies such as those by Otto and Pensini (2017), showing that Forest School programs can be a successful method for promoting environmentally responsible behaviors in children.

Based on these results, it is recommended that Forest School practices be more widely integrated into preschool education programs. Moreover, families should be actively involved in these nature-based

processes, as early exposure to nature provides a strong foundation for raising environmentally responsible individuals (Cudworth 2021; Çetinöz 2025; Harris 2021). Preschool curricula should prioritize nature-based activities that strengthen children's emotional connection to the environment (Başbay and Atmaca 2022; Harris 2021).

Teachers also play a critical role and should receive in-service training on nature-based education methods and the philosophy of Forest School to guide children more effectively in nature-based learning (Blackwell 2015; Cudworth 2021). Creating opportunities for nature contact both at home and outside school can help reinforce children's connection with the natural world. Cooperative efforts among local governments, NGOs, and educational institutions should be established to organize nature walks, camping activities, and child-focused environmental projects. Such initiatives will further strengthen children's positive attitudes and behaviors toward the environment (Nawaz and Blackwell 2014). Future research should investigate the long-term effects of nature-based education with different age groups and in varying environmental contexts to provide a broader understanding of the impacts of nature-integrated learning (Elliot and Krusekopf 2018; O'Brien and Murray 2007).

Ultimately, this study confirms that children's early emotional connection with nature is foundational to the development of pro-environmental behaviors (Cumming and Nash 2015; Otto and Pensini 2017). Children's perceptions of nature influence their personal development and future environmental responsibility. Systematically supporting Forest School practices in early education will contribute to children's cognitive, social, and emotional development and foster long-lasting environmental awareness.

Ethics approval and consent to participate

Ethical approval for this study was obtained from the ***Usak University Social and Human Sciences Scientific Research and Publication Ethics Committee (Decision No: 2023-81, dated 12 April 2023)***. The study was conducted in accordance with ethical standards for research involving human participants. All procedures involving human participants were conducted in accordance with the ethical standards of the institutional research committee and with the Declaration of Helsinki.

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Data deposition

The research data supporting this study are securely stored by the author and are available upon request, subject to ethical approval and privacy considerations.

Supplemental online material

No supplemental online material is associated with this article.

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Table 1 Forest Biotic elements

Forest Elements							
Biotic Elements							
Plant				**Wild Animal**			
Group D	**f**	**Group K**	**f**	**Group D**	**f**	**Group K**	**f**
Tree	10	Tree	12	Bee	5	Gorilla	1
Tree bark	1	Pine tree	1	Lion	1	Butterfly	1
Tree roots	1	Grass	6	Cicada	1	Bird	6
Flower	4	Apple tree	1	Turtle	2	Seagull	1
Grass	8	Cherry	1	Ant	3	Duck	1
Bough	1	Pine cone	1	Butterfly	4	Tiger	1
Mulberry	1	Wood block	1	Frog	1	Dolphin	1
Apple Tree	2			Bird	5		
Sapling	1			Seagull	1		
Rose	1			Duck	2		
Cactus	2			Snail	3		
Cherry	3			Squirrel	2		
Hive	1			Ladybird	1		
Pine cone	1			Snake	2		
Root	2			Giraffe	4		
Dried tree	1						
Banana	1						
Herbs	1						
Leaves	1						
Total	**43**		**23**	**Total**	**37**		**12**

Table 2 Forest Abiotic Elements

Forest Elements							
Abiotic Elements							
Natural Phenomena				**Geographical Forms**			
Group D	**f**	**Group K**	**f**	**Group D**	**f**	**Group K**	**f**

Clouds	12	Moon	2	Mountain	1	Sea	2
Rainbow	4	Night	1	Sea	2	Lake	1
Sky	3	Star	13	Lake	2	River	1
Sun	13	Cloud	2	Soil	2	Waterfall	2
Wind	2		6	Underground	1	Rock	1
Total	**34**		**24**	**Total**	**8**		**7**

Table 3 Non-Forest Biotic Elements

Non-Forest Elements							
Biotic Elements							
Human				**Pet**			
Group D	**f**	**Group K**	**f**	**Group D**	**f**	**Group K**	**f**
Dad	2	Mother	3	Cat	3	Cat	1
Child	3	Friend	1	Dog	2	Dog	2
		Father	5				
		Child	13				
		Brother	1				
		Teacher	1				
Total	**5**		**24**	**Total**	**5**		**3**

Table 4 Non-Forest Abiotic Elements

Non Forest Abiotic Elements											
Structure				**Equipment**				**Other**			
Group D	**f**	**Group K**	**f**	**Group D**	**f**	**Group K**	**f**	**Group D**	**f**	**Group K**	**f**
School	1	Treehouse	2	Barbecue	1	Tent	6	Forest love	1	Flag	1
Garden	1	House	2	Blanket	3	Rug	1	Protect forest	1	Meat	1
House	4	Bridge	2	Swing	2	Barbecue	3	Flag	3	Heart	1
Castle	1	Cabin	1	Bicycle	1	Music box	1	Danger sign	1	Black hole	1
Camp ground	1	Birds Nest	2	Tent	4	Swing	3	Icecream	1	Railway	1
Village house	1					Ball	2	Fire	1	Ufo	1
								Fireprotect	1	Alien	1
										Fire	3
Total	**9**		**9**	**Total**	**11**		**16**		**9**		**10**