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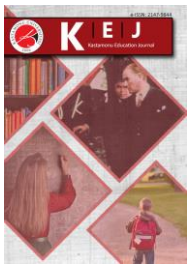

|Research Article/ Araştırma Makalesi|

# The Effectof Integrated Turkish and Science Activities in Pre-School Education on Children's Environmental Perception*

# Okul Öncesi Eğitimde Bütünleştirilmiş Türkçe ve Fen Etkinliklerinin Çocukların Çevre Algısına Etkisi

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**Keywords**
1. Preschool education
2. Integrated activity
3. Picture book for children
4. Environmental perception

**Anahtar Kelimeler**
1. Okul öncesi eğitim
2. Bütünleştirilmiş etkinlik
3. Resimli çocuk kitabı
4. Çevre algısı

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**Abstract**

*Purpose of the Study:* The purpose of this study is to determine the effect of integrated Turkish and science activities in the preschool period on children's environmental perception.

*Materials and Methods:* In the qualitative dimension of the mixed method, a phenomenological design was employed, while in the quantitative dimension, a quasi-experimental design was used. Thestudy conductedwith 20 children.In the experimental procedure, children in both the experimental and control groups were asked to draw an environment picture, and one-on-one interviews were conducted with the children regarding their drawings. The drawings were evaluated using DAET-R and were attempted to be transformed into qualitative form with yellow and blue color tones.

*Findings:* In the final tests, experimental groups' figures increased in the drawings. It was found that the final test drawings of the children in the experimental group were related to the illustrated books used in the integrated activities.

*Key Points:* As a result of the study, it was determined that the change in environmental perception of the children in the experimental group, where integrated Turkish and science activities developed with illustrated children's books were applied, progressed more prominently compared to the children in the control group.

**Öz**

*Çalışmanın amacı:*Bu çalışmanın amacı okul öncesi dönemde bütünleştirilmiş Türkçe ve fen etkinliklerinin çocukların çevre algısına etkisini belirlemektir.

*Materyal ve Yöntem:* Karma yöntemin nitel boyutunda fenomenolojik desen, nicel boyutunda ise yarı deneysel desen kullanılmıştır. Araştırmanın örneklemini 20 çocuk oluşturmaktadır. Çocuklarabir çevre resmi çizmeleri istenmiş ve çocuklarla yaptıkları çizimler hakkında birebir görüşmeler yapılmıştır. Çizimler Bir Çevre Çiz Test Rubriği ile değerlendirilmiş ve ilgili rubrik sarı ve mavi renk tonları ile nitel hâle evrilmeye çalışılmıştır.

*Bulgular:* Deney grubunun son testlerinde çizdiği resimlerde çevre ile ilgili figürler artmıştır. Deney grubundaki çocukların son test çizimlerinin bütünleştirilmiş etkinliklerde kullanılan resimli kitaplarla ilgili olduğu bulgulanmıştır.

*Önemli Vurgular:* Araştırmanın sonucunda, resimli çocuk kitapları ile geliştirilen bütünleştirilmiş Türkçe ve fen etkinliklerinin uygulandığı deney grubundaki çocukların çevre algılarındaki değişimin kontrol grubundaki çocuklara göre geliştiği ve daha belirgin olduğu belirlenmiştir.

*This study is based on the master dissertation accepted by the Kastamonu University Institute of Social Sciences in December 2023.

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## INTRODUCTION

The preschool period, which is considered as the golden years in an individual's life, is known as a critical period during which children experience rapid development in social-emotional, cognitive, language, motor skills, and self-care abilities (Satterlee, 2010; Yılmaz, 2010; Ahi et al., 2014). The behaviors and knowledge acquired during this period tend to be long-lasting (Satterlee, 2010; Yılmaz, 2010; Ahi et al., 2014). The knowledge, skills, and habits acquired during the preschool period are considered to be more structuring in life compared to those acquired in other developmental stages.

Assisting children in completing the preschool period efficiently can be achieved through providing them with rich and diverse learning environments. For the benefit of children in preschool education, educational environments are expected to be well-structured, flexible, inclusive, consistent, up-to-date, and scientific. The concept of the environment, including environmental issues, environmental awareness-attitude, and sustainable development, is among the current topics that can be addressed during the preschool period (Seppälä, 2022). Adapting activities to the principles of relevance and proximity to life in preschool education environments ensures that children complete this critical period effectively (MEB, 2013).

Environmental sustainable behaviors (such as recycling, respect for living beings, energy conservation, environmental protection, etc.) necessitate a correct environmental awareness (Sawyer, 2013). To gain this awareness, increasing individuals' environmental perception through environmental education is important (Shepardson et al., 2007; Özdemir, 2010; Cheng and Monroe, 2012). Grodzińska-Jurczak (2006) noted that the effects of environmental education largely depend on the age at which education begins. Therefore, it is considered important to prioritize environmental education given during the preschool period.

As our responsibility towards the environment increases, how the concept of the environment is perceived becomes important. Depending on the individual's perspective, different definitions of the environment concept can be made (Şahin, 2008). When making these definitions, age, experience, and the effectiveness of the environmental education provided are considered. Fleer (2002) found in her study with children of different ages that children's perceptions of the environment they want to live in are technology-based, and as the age of the participating children increases, there is a pessimistic view of environmental awareness for the future.

The achievements and concepts aimed to be gained by preschool children are found in Turkish, science, mathematics, play, music, art, movement activities, and field trips in educational environments. Environmental sensitivity and awareness are sought to be imparted to children through activities during this period. Moreover, in preschool education, the integration of multiple activity types with appropriate transitions creates integrated activities in educational environments (MEB, 2013). The integration of Turkish and science activities forms the basis for the experimental part of this research.

According to the Preschool Education Program, Turkish activities are planned to help children speak Turkish correctly and beautifully, develop their vocabulary, facilitate their daily lives, and ultimately improve their communication skills (Öztürk, 2010; MEB, 2013, p. 46).

Preschool children who do not know how to read and write can meet their communicative need for reading books through adults in Turkish activities (Karaman Benli, 2018). Thus, Turkish activities create a meaningful language environment for children (Öztürk, 2010). This environment helps children progress in their cognitive, language, and socio-emotional development areas (Uslu, 2020).

The diversity of topics covered in Turkish activities may increase the frequency of implementation of these activities in educational environments. Because any topic in the child's daily life can be included in Turkish activities with illustrated children's books. Recently, issues such as sustainability, including recycling, reuse, carbon and water footprint, food consumption, and efficient use of natural resources, are included in educational environments through children's books (Kuşçuoğlu, 2022).

Illustrated children's books, one of the materials used in Turkish activities, can contribute to children's learning of scientific concepts and the development of early literacy skills (Leung, 2008). To develop early literacy skills, teachers should read books aloud to children and create environments in classrooms where children can examine books (Rixsiboyevna, 2020). Additionally, a child who wants to establish a relationship between the picture and the text in picture books will engage in a cognitive process (Dong, 2016). As the subject in the book is processed in the mind, the development of characteristics such as knowledge, perception, and awareness related to the subject is expected.

The reading action involves analyzing any visual or auditory product created for meaning, such as a picture, cartoon, symbol, and it is when a written text gains meaning in the reader's mind (İnce Samur, 2016). To adapt to changing and evolving world conditions, it is important for reading action to be at a desirable level and for "reading" to become a culture in the individual (Akkaya, 2021). When considering that the responsibility of preschool period is to gain children's love of books, practices carried out through books can be considered as the first steps taken to create a reading culture (Öztürk, 2020).

Reading culture; starting from the preschool period, it is the process of the individual encountering visual and written cultural products, gaining a love and interest in reading, acquiring reading skills as the educational level increases, turning this skill into a reading habit, then raising the reading skill to a critical reading level and transforming it into a lifestyle (İnce Samur, 2016). Reading culture in the preschool period is largely provided through children's literature products (Akkaya, 2021). Practices starting from this period and bringing children's literature together with other areas are effective in gaining children's reading culture (Öztürk, 2020). Children who meet books at an early age feel the need to benefit from literature, thus, this need can be considered as the

first step of reading culture. In short, reading culture, defined as the reading action turning into a lifestyle, also stems from the individual's need for literature.

The attention spans of preschool children during activities may be short. Integrating activities with appropriate transitions is useful for maintaining continuity in teaching. Ensuring continuity in activities will contribute to children's easier acquisition of the relevant achievement. In a study conducted to determine the views of preschool teachers about the preschool education program, half of the participating teachers (n=20) stated that they preferred integrated activities to achieve the relevant achievement (Köksal et al., 2016).

In a study involving 255 preschool teachers, teachers expressed the importance of integrated curriculum with the following statements:

- Integrated curriculum is child-centered.
- Integrated curriculum ensures that children learn permanent knowledge.
- Integrated curriculum prepares children for primary education.
- Preschool teachers can implement integrated curriculum more easily, creatively, and fun (Öztürk and Tantekin Erden, 2011).

In another study conducted with preschool teachers (n=22), teachers specified the categories of activities to be conducted during reading and after-reading activities. In the category of activity types during reading, drama activity, question-answer, and art activity were mentioned by teachers. These specified categories may necessitate considering other types of activities that can be integrated with reading activities. After reading picture storybooks, various activities can be used under the category of expansion activities (Hsiao & Shih, 2016). Martin et al. (2019), through the examination of 30 children's books, stated that integrating other disciplines with picture books affects children's environmental awareness and attitudes towards science. In his study, Dilidüzgün (2004) provides examples of how storybooks can be integrated with other activities or daily life in the correlation sections of the practice examples he presents regarding storybooks.

Similowski (2022) provided examples of experiments that encourage thinking about the reading experience and turning reading into action. Teachers often use nursery rhymes, finger games, and question-answer methods in Turkish activities to attract children's interest in science activities (Özbek & Sığırtmaç, 2009). Picture books are frequently used in preschool Turkish activities (Çabuk et al., 2017). In addition, integrating science activities with picture books may be effective in imparting scientific concepts to children (Yıldız, 2019). French (2004) implemented an intervention program where science activities were integrated with children's literature and noted that children made linguistic and cognitive development progress as a result of the study.

In preschool education classrooms, children's literature can be combined with science activities. Therefore, in the teacher training process, candidates should be equipped with skills for integrating science activities with computer technology, children's literature, and mathematics (Saçkes et al., 2012). Integrating science activities with other activities in educational environments helps children acquire cognitive skills and also helps correct children's misconceptions (Ansberry & Morgan, 2010; Bahar & Aksüt, 2020). While ensuring this integration, it is expected that picture books will be compatible with the nature of science and technology (Cho & Kim, 1998).

The field of science is intertwined with life and various topics in children's books, and these plots can provide children with different perspectives and understandings (Demircioğlu et al., 2006). In their study, Yulıana et al. (2021) provided context-based science education to fifth-grade students through picture books on real-life issues, and an increase in children's scientific literacy was observed in the final test. Integrating different disciplines in educational practices may largely depend on the structure of the subject matter being addressed.

Environmental education has a structure suitable for integrating different disciplines into educational environments (NAAEE, 1999). Different methods and techniques support children's learning and enable them to gain versatile experiences (Lukkarinen & Peltola, 2018). In this sense, integrated activities contribute to the development of children's environmental awareness (Akbayrak & Kuru Turaşlı, 2017). Therefore, integrated activities are thought to involve children in a comprehensive educational content without disrupting the integrity of learning environments. Because this type of activity, designed by integrating at least two activities, can create a productive learning environment for children by balancing the strengths and weaknesses of the activities that make it up.

Integrating activities in the preschool period can open the door to an interdisciplinary educational environment. Interdisciplinary approach is based on relationships rather than distinctions (Sever & Yalçınkaya, 2018). Different disciplines can also be discussed in integrated activities. Especially, picture books used in Turkish activities are integrated with various activity types to teach children concepts and achievements related to environment, science, art, social relations, and societal values, and children gain knowledge and skills related to different disciplines through books used in activities. This study investigates the effect of integrated Turkish and science activities on preschool children's environmental perception.

METHOD/MATERIALS A mixed-method approach was used in the study. Mixed-method is a method in which qualitative and quantitative methods/data are used together. The qualitative dimension of the study used a phenomenological design. In phenomenological design, the perception of a group related to a phenomenon is tried to be determined. In this design, researchers try to obtain in-depth information about the inner world of participants. Interviews are mostly used in phenomenological design (Fraenkel et al., 2012). This study attempts to reveal the environmental perceptions of children aged 48-72 months in the

preschool period through the pictures they draw. To conduct in-depth examination, the drawings made by children and the expressions they used to describe their drawings were used.

The quantitative dimension of the study used a quasi-experimental design. In quasi-experimental models, the researcher applies the process he/she wants to see the effect of on the experimental group, and does not apply any process to the control group. The researcher has the opportunity to evaluate the effect of the program applied in the quasi-experimental model's post-test (Cohen et al., 2017/2021).

Sample The study group (sample) of the research consists of preschool children aged between 48-72 months who attended kindergarten in the 2022-2023 academic year. The research includes a total of 20 children, with 10 children in the experimental group and 10 children in the control group. The district where the children are located/reside is rich in natural beauty and intertwined with nature. The sample of the research was selected through convenience sampling, which is one of the non-probability sampling methods. Convenience sampling method is the selection of a sample group that the researcher can easily reach in terms of time, money, and labor factors (Fraenkel et al., 2012).

Data Collection Tools In the research, children's drawings related to the environment and the interview notes about these drawings were used as data collection tools. Interviews about the drawings help guide researchers in understanding expressions that the individual cannot express or did not express in the drawing (Gan, 2021). In addition, drawings made by children are a communication tool that allows us to describe children's inner worlds, reveal the interaction of the child with the environment, and enable children to express their inner world through drawings when they cannot express it in language (Yılmaz, 2010; Yavuzer, 2017).

One-on-one interviews were conducted about the drawings made by the children, and the children were asked to explain their drawings. The questions asked to the children during the interviews were as follows:

1. What do you think the environment is?
2. What constitutes the environment?
3. What living and non-living things are there in our environment?
4. Do you like the environment? Why?
5. What does your drawing tell us?

In the research, the drawings made by children were converted into quantitative data using the "Draw-An-Environment Test Rubric (DAET-R)" to score the drawings. In the scoring stage, the "Draw-An-Environment Test Rubric (DAET-R)" developed by Moseley et al. (2010) was used. Such scales are used to measure an individual's perception of any subject (Jose et al., 2017). The Turkish version of this rubric was obtained from Ahi's (2015) study.

**Draw an Environment Test – Rubric (DAET-R)**

| *Factör* | *Present* | *Interactions with other factors* | *System interactions made explicit* | *P.* |
|---|---|---|---|---|
| | **0 point** | **1 point** | **2 point** | **3 point** |
| *Human* | Drawing does not contain pictures of humans. | Human(s) drawn without any apparent interaction with other factors. | Human(s) drawn interacting with other humans and/or another factor (e.g., human fishing or walking on a bridge), but without special emphasis placed on the influence of the interaction on the environment. | Humans drawn with obvious deliberate emphasis placed on interaction with one or more factors and the influence of that interaction on the environment through the use of special indicators such as conceptual labels and/or arrows. |
| *Living organism* | Drawing does not contain pictures of living organisms. | Living organisms (e.g., plants and animals) drawn without any apparent interaction with other factors | Living organisms drawn interacting with other living organisms and/or another factor (e.g., animals grazing), but without special emphasis placed on the influence of the interaction on the environment. | Living organisms drawn with obvious deliberate emphasis placed on interaction with one or more factors and the influence of that interaction on the environment through the use of special indicators such as conceptual labels and/or arrows. |
| *Abiotic element* | Drawing does not contain pictures of abiotic factors. | Abiotic items (e.g., mountains, rivers, Sun, or clouds) drawn without any apparent interaction with other factors. | Abiotic items drawn interacting with other abiotic items and/or another factor (e.g., wind blowing a palm tree), but without special emphasis placed on the influence of the interaction on the environment. | Abiotic items drawn with obvious deliberate emphasis placed on interaction with one or more factors and the influence of that interaction on the environment through the use of special indicators such as conceptual labels and/or arrows. |
| *Man-made* | Drawing does not contain pictures of human built factors. | Human built or designed items (e.g., buildings, automobiles, and bridges) drawn withoutany apparent interactionwith other factors. | Human built items drawn interacting with other human built items and/or another factor (e.g., smokestackdeliberate emphasis placed on interaction with emitting smoke into the air), but without special emphasisone or more factors and the influence of that placed on the influence of the interaction on the interaction on the environment through the use environment. of special indicators such as conceptual labels and/or arrows. | Human built items drawn with obvious |

Total possible points: 12 Total points

**Figure 1.Draw-An-Environment Test (DAET-R)**

### Data Collection Process

The data were collected over a period of 9 weeks. Initially, children in the experimental and control groups were asked the question "What do you think the environment is?" and were requested to make a drawing related to their perceived environment. Necessary precautions were taken to ensure that children were not influenced by each other. Pastel paint was preferred for drawing as it was easy for children to use. The flowchart of the study process is presented in the table below.

**Table 1. Flowchart of the study process**

| Group name | Pre test | The implementation of integrated activities | Post test |
|---|---|---|---|
| **Experimental Group** | X | X | X |
| **Control Group** | X | | X |

The interviews were conducted in environments familiar to the children. During the interviews, children were asked to describe the compositions in their drawings and the codes they used. To find answers to these questions, children were asked, "Can you tell me about your drawing? What did you draw here (pointing to the drawn figure)?" The responses given by the children were noted by the researcher. This process was applied to both the experimental and control groups as pre-test and post-test.

Nine integrated Turkish and science activities, developed within the scope of the research, were implemented for the experimental group once a week (on Mondays) for nine weeks by the researcher. This duration has also been found sufficient in relevant studies (Özdemir & Uzun, 2006; Gezgin, 2019; Köroğlu, 2019; Yıldız, 2019). The children in the control group did not receive any education related to the environment for nine weeks, and the activities in the existing preschool education program continued to be implemented according to the class teacher's plan.

**Table 2. Activities implemented within the scope of the study**

| The name of the activity | The illustrated children's book used in the activity | The desired achievement related to the environment |
|---|---|---|
| **Where Do You Live?** | Pepe the Snail and Zeze the Giant Whale | • Gains knowledge about the habitats of animals.<br>• Respects the lives of living beings. |
| **Let the Animals Appear!** | Small Animals | • Pays attention to animals of different sizes living in the environment.<br>• Respects the diversity in the environment. |
| **How Does a Tree Feed?** | Generous Tree | • Gains knowledge about the parts of a tree.<br>• Becomes aware of the benefits of trees. |
| **The Journey of a Seed** | Tiny Seed | • Develops awareness about the growth stages of seeds.<br>• Gains knowledge about the living conditions of surrounding plants. |
| **Çeri and Friends** | Green Tomato Cherry | • Develops awareness about living and non-living beings in the environment. |
| **Our Clean Environment** | Ecological Neighborhood | • Gains awareness about recycling.<br>• States what needs to be done to keep the environment clean. |
| **What Happened to the Snowflake?** | Little Snowflake | • Gains knowledge about the different states of water.<br>• Develops awareness about natural phenomena in the surrounding environment.<br>• |
| **Let's Build a Home for Soso** | Soso's Compost Book | • Acquires knowledge about the formation of soil.<br>• Gains awareness about life within the soil. |
| **What is the Purpose of Rainwater?** | Water is Life | • Explains the importance of water for our lives.<br>• Explores different ways to conserve water. |

The activities related to science were allocated one week each, as observation is required for each activity. Indeed, in early childhood, children should be given time to observe and share their observations with others in order to become literate in science (AAAS, 1993).

**Table**Hata! Belgede belirtilen stilde metne rastlanmadı.**. Book titles used in activities**

| Book title | Author | Page count | Publication year |
|---|---|---|---|
| **Small Animals** | Bahar Havzalı Şener | 20 | 2019 |
| **Pepe the Snail and Zeze the Giant Whale** | Julia Donaldson | 31 | 2021 |

| | | | |
|---|---|---|---|
| **Tiny Seed** | Eric Carle | 32 | 2022 |
| **Generous Tree** | Shel Silverstin | 60 | 2018 |
| **Green Tomato Cherry** | Gonca Mine Çelik | 32 | 2018 |
| **Ecological Neighborhood** | Ralph Weder | 32 | 2021 |
| **Little Snowflake** | Sima Özkan | 30 | 2022 |
| **Soso's Compost Book** | Charles Ghigna | 24 | 2018 |
| **Water is Life** | Suzanne Fossey | 24 | 2022 |

## Data Analysis

Quantitative data obtained from the DAET-R (Draw-An-Environment Test Rubric) have been converted into qualitative form using shades of yellow and blue. For the analysis of the research data, the scoring criteria within the DAET-R have been transformed into colors (yellow and blue). Possible scores from the relevant rubric are represented with the following colors:

**Table 4.The expression of the items of DAET-R in shades of yellow.**

| The relevant factor is not included in the picture | The existing figure | Interaction with other factors | Open interaction within the system |
|---|---|---|---|
| **0 point** | **1 point** | **2 point** | **3 point** |

The total points that can be obtained from the rubric are represented in shades of blue. The points obtained from the rubric table are reflected on the blue color scale as follows. It can be said that as the color tone obtained from the child's drawing darkens, their environmental perception has also developed.

**Table1.The expression of total scores obtained from DAET-R in shades of blue.**

| 0-1-2-3 point | 4-5-6 point | 7-8-9 point | 10-11-12 point |
|---|---|---|---|
| **Low** | **Average** | **Good** | **Very good** |

Furthermore, the points obtained by the children from the rubric table were entered into the SPSS 23 program, and the necessary analyses were conducted.

## FINDINGS

| | Human | | Living organism | | Abiotic element | | Man-made | |
|---|---|---|---|---|---|---|---|---|
| | *pre* | post | pre | post | pre | post | pre | post |
| $D_1$ | | | | | | | | |
| $D_2$ | | | | | | | | |
| $D_3$ | | | | | | | | |
| $D_4$ | | | | | | | | |
| $D_5$ | | | | | | | | |
| $D_6$ | | | | | | | | |
| $D_7$ | | | | | | | | |
| $D_8$ | | | | | | | | |
| $D_9$ | | | | | | | | |
| $D_{10}$ | | | | | | | | |

**Figure 2.Results of the categories of DAET-R in the pre-test and post-test of the experimental group.**

**Table 6. The codes and frequencies used in the pre-test and post-test drawings of the experimental group.**

| Codes | Pretest (f) | Posttest (f) |
|---|---|---|
| **Person** | 15 | 15 |
| **Tree** | 9 | 14 |
| **Sun** | 7 | 8 |
| **Grass** | 5 | 8 |
| **House** | 5 | 4 |
| **Rainbow** | 3 | 0 |

| | | | |
|---|---|---|---|
| **Cloudy** | 2 | | 4 |
| **Fruit** | 2 | | 3 |
| **Bushes** | 1 | | 0 |
| **Lightning** | 1 | | 0 |
| **Garbage truck** | 1 | | 0 |
| **Mountain** | 1 | | 0 |
| **Flower** | 1 | | 2 |
| **Rain drop** | 1 | | 6 |
| **Watercolor** | 1 | | 0 |
| **Table** | 1 | | 0 |
| **Chair** | 1 | | 0 |
| **Basket** | 1 | | 0 |
| **Rabbit** | 1 | | 3 |
| **Seed** | 0 | | 1 |
| **Bird** | 0 | | 3 |
| **Fly** | 0 | | 1 |
| **Dog** | 0 | | 1 |
| **Cat** | 0 | | 3 |
| **Chicken** | 0 | | 1 |
| **Flamingo** | 0 | | 2 |
| **Giraffe** | 0 | | 1 |
| **Goal** | 0 | | 1 |
| **Rubbish** | 0 | | 4 |
| **Bin** | 0 | | 1 |
| **Watering can** | 0 | 1 | |
| **Toy** | 0 | | 1 |
| **tree roots** | 0 | | 2 |
| **Moon** | 0 | | 1 |
| **Star** | 0 | | 1 |
| **Total** | **59** | | **92** |

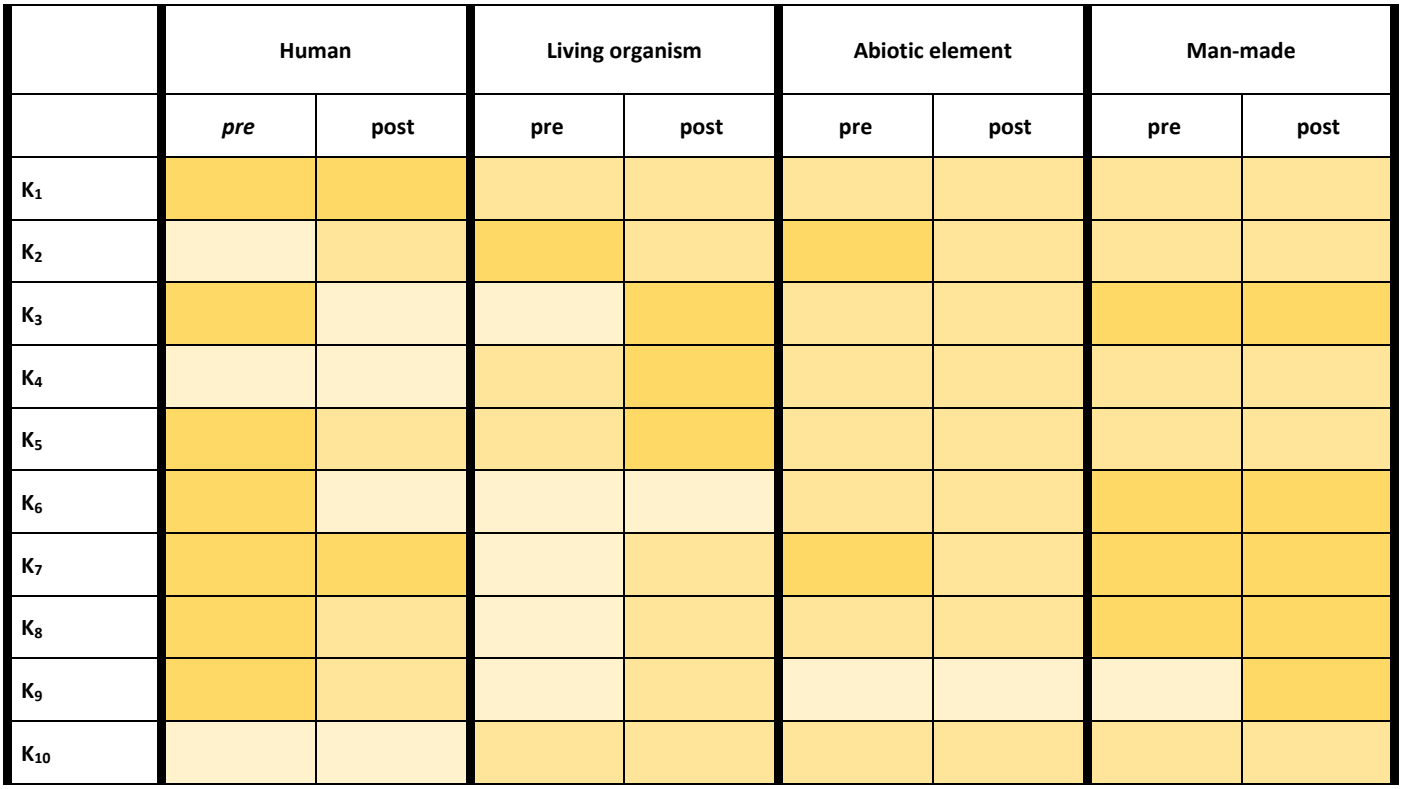



**Figure3. The results of the control group's categories from the DAET-R in the pre-test and post-test.**

**Table 7. The codes and frequencies used in the pre-test and post-test drawings of the control group.**

| Codes | Pretest (f) | Posttest (f) |
|---|---|---|
| **Person** | 23 | 15 |
| **Car** | 12 | 15 |
| **Cloudy** | 8 | 5 |

| | | |
|---|---|---|
| **House** | 7 | 5 |
| **Sun** | 4 | 6 |
| **Path** | 2 | 2 |
| **Traffic sign** | 2 | 0 |
| **Grass** | 3 | 7 |
| **Fish** | 3 | 0 |
| **Octopus** | 1 | 0 |
| **Sea** | 1 | 0 |
| **Soil** | 1 | 1 |
| **Snake** | 1 | 1 |
| **Swing** | 1 | 0 |
| **Toy** | 1 | 1 |
| **Washing** | 1 | 1 |
| **Tree** | 0 | 6 |
| **Flower** | 0 | 5 |
| **Bin** | 0 | 2 |
| **Umbrella** | 0 | 1 |
| **Bird** | 0 | 3 |
| **Spider** | 0 | 1 |
| **Total** | **71** | **77** |

The findings obtained from the interviews and evaluations are as follows: It was observed that both the control and experimental group children categorized the entities in the environment where the interviews were conducted in response to the question "What is alive and non-living in your environment?" In the preliminary interviews of both the experimental and control groups, it was found that the children classified trees as non-living. While this situation continued in the final interviews of the control group children, the experimental group children stated that trees were living in the final interviews. It was noticeable that both experimental and control group children frequently used the human factor in their pre-test and post-test drawings, but the number of children in the experimental group emphasizing the effect of humans on the environment (dirty and clean environment) increased in their final test drawings.

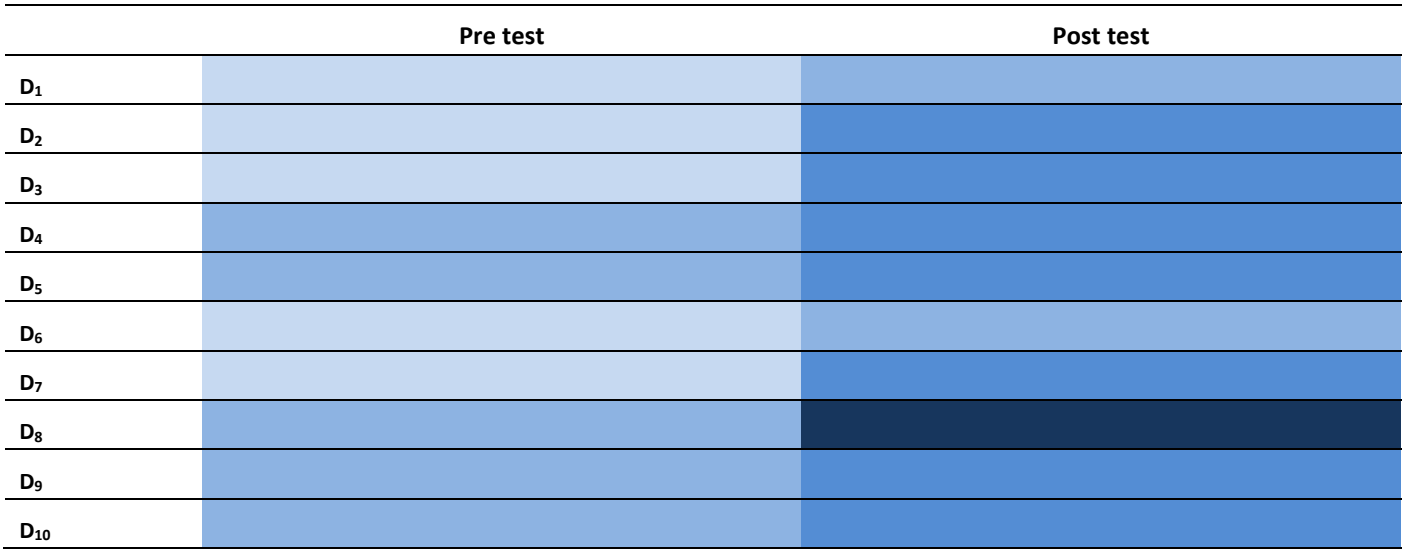
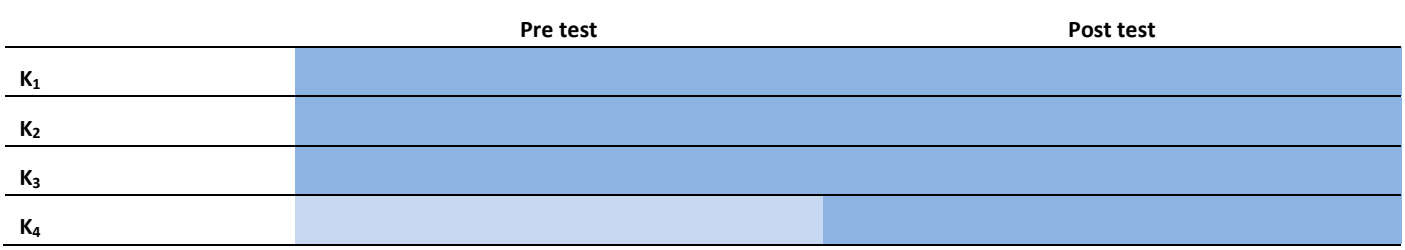



**Figure4. The results obtained from DAET-R in the pre-test and post-test of the experimental group.**

Children with codes D1 and D6 had poor environmental perceptions in the pre-test, but this improved to a moderate level in the post-test. Children with codes D2, D3, and D7 showed an improvement in environmental perception from poor to good. Children with codes D4, D5, D9, and D10 saw their environmental perceptions improve from moderate to good in the post-test. The environmental perception of the child with code D8 improved from moderate to very good in the post-test. It can be observed that the environmental perception of the children in the experimental group increased in the post-test according to the blue color tone obtained from the DAET-R.



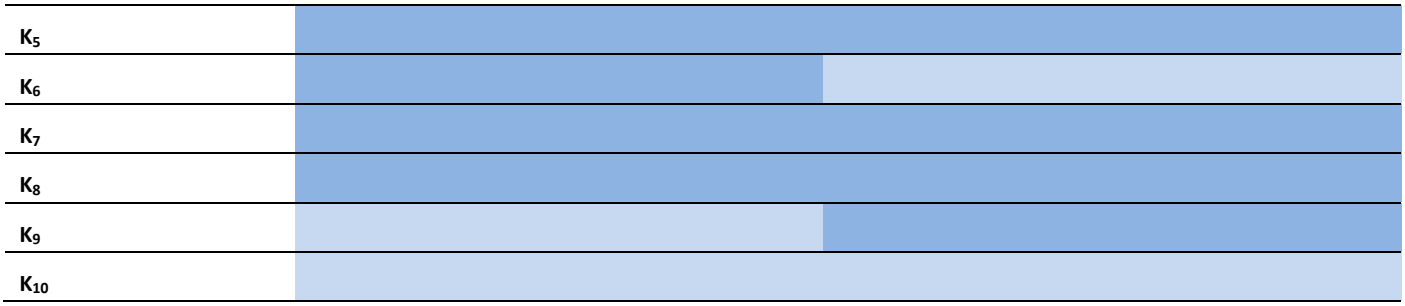



**Figure5.The results obtained from the DAET-R for the control group in the pre-test and post-test.**

Out of the children in the control group, six of them have maintained a moderate level of environmental perception in both the pre-test and post-test. The environmental perception of the child with code $K_6$ has deteriorated from a moderate level to a poor level in the post-test. The environmental perception of the child with code $K_{10}$ has remained at a poor level without any change in the post-test. The environmental perception of the children with codes $K_4$ and $K_9$ has improved from a poor level to a moderate level in the post-test.

**Table 8. The number of codes used by the experimental and control groups in the pre-test and post-test are as follows**

| Group | Pre-test (f) | Post test (f) |
|---|---|---|
| **Experimental** | 59 | 92 |
| **Control** | 71 | 77 |
| **Total** | 130 | 169 |

In the experimental group, the total number of codes used in the pre-test was 59, while this number increased to 92 in the post-test, indicating a 55.9% increase. In the control group where integrated Turkish and science activities were not implemented, the total number of codes increased from 71 to 77 in the post-test.

## The Statistical Tests and Analyses Conducted within the Scope of the Research

During the data collection phase of the research, the scores obtained by children from the rubric sheets were transferred to the SPSS 23 program, and the tests and analyses conducted were expressed through the following tables.

Skewness and kurtosis values for participants' pre-test and post-test rubric scores were evaluated (Table 9). Skewness and kurtosis were examined within the range of +2 and -2 (Huck, 2012). According to the results obtained, it was determined that the skewness values of participants' pre-test and post-test rubric scores (pre-test=-0.538, post-test=0.609) and kurtosis values (pre-test=-0.544, post-test=0.356) were within the range of -2 to +2. Since the skewness and kurtosis values were within the -2 to +2 range, it was found that the pre-test and post-test rubric scores of the participants followed a normal distribution.

**Table9.The descriptive findings and skewness-kurtosis values for all participants' pre-test and post-test rubric scores were evaluated.**

| | X ± SS | M | Min - Max | Skewness | Kurtosis |
|---|---|---|---|---|---|
| Pre Test | 3,90 ± 1,33 | 4,00 | 1 - 6 | -0,538 | -0,544 |
| Post Test | 6,00 ± 2,05 | 6,00 | 3 - 11 | 0,609 | 0,356 |

The skewness and kurtosis values for the pre-test and post-test rubric scores of participants in the control and experimental groups were examined (Table 10). According to the results obtained, it was found that the skewness values of the pre-test and post-test rubric scores of participants in the control group (pre-test=-1.262, post-test=-0.111) and the kurtosis values (pre-test=-0.068, post-test=-0.623) were within the range of -2 to +2. Since the skewness and kurtosis values were within the -2 to +2 range, it was determined that the pre-test and post-test rubric scores of participants in the control group followed a normal distribution.

It was determined that the skewness (0.000) and kurtosis (0.239) values of the pre-test rubric scores of the participants in the experimental group were within the range of -2 to +2. Since the skewness and kurtosis values were within this range, it was found that the pre-test rubric scores of the participants in the experimental group followed a normal distribution.

**Table10.Descriptive findings and skewness-kurtosis values for pre-test and post-test rubric scores of participants in the control and experimental groups.**

| | | X ± SS | M | Min - Max | Skewness | Kurtosis |
|---|---|---|---|---|---|---|
| Control Grubu | Pre Test | 4,30 ± 1,16 | 5,00 | 2 - 5 | -1,262 | -0,068 |
| | Post Test | 4,40 ± 9,97 | 4,50 | 3 - 6 | -0,111 | -0,623 |
| | Pre Test | 3,50 ± 1,43 | 3,50 | 1 - 6 | 0,000 | 0,239 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Experimental Grubu | Post Test | 7,60 ± 1,51 | 7,00 | 6 - 11 | 1,348 | 2,082 |

It was determined that the skewness value of the post-test rubric scores of the participants in the experimental group is 1.348, and the kurtosis value is 2.082. Since the kurtosis value is not between -2 and +2, it was found that the post-test rubric scores of the participants in the experimental group did not show a normal distribution. Therefore, square root transformation was applied to the participants' pre-test and post-test rubric scores.

**Table11.Descriptive findings and skewness-kurtosis values for pre-test and post-test rubric scores of all participants after square root transformation.**

| | X ± SS | M | Min - Max | Skewness | Kurtosis |
|---|---|---|---|---|---|
| Pre Test | 1,94 ± 0,37 | 2,00 | 1,0 – 2,5 | -0,953 | 0,536 |
| Post Test | 2,42 ± 0,42 | 2,45 | 1,7 – 3,3 | 0,197 | -0,228 |

The skewness and kurtosis values of participants' pre-test and post-test rubric scores after square root transformation were examined (Table 11). According to the results obtained, it was determined that the skewness (pre-test=-0.953, post-test=0.197) and kurtosis values (pre-test=0.536, post-test=-0.228) of participants' pre-test and post-test rubric scores after transformation were between -2 and +2. Due to the skewness and kurtosis values being between -2 and +2, it was determined that participants' pre-test and post-test rubric scores were normally distributed after square root transformation.

**Table12.Descriptive findings and skewness-kurtosis values for pre-test and post-test rubric scores of participants in the control and experimental groups after square root transformation.**

| | | X ± SS | M | Min - Max | Skewness | Kurtosis |
|---|---|---|---|---|---|---|
| Control Grubu | Pre Test | 2,05 ± 0,31 | 2,24 | 1,4 – 2,2 | -1,362 | 0,464 |
| | Post Test | 2,09 ± 0,23 | 2,12 | 1,7 – 2,5 | -0,309 | -0,658 |
| Experimental Grubu | Pre Test | 1,83 ± 0,41 | 1,87 | 1,0 – 2,5 | -0,647 | 0,833 |
| | Post Test | 2,75 ± 0,26 | 2,65 | 2,5 – 3,3 | 1,137 | 1,479 |

The skewness and kurtosis values of the pre-test and post-test rubric scores of participants in the control and experimental groups after square root transformation were examined (Table 12). According to the results obtained; it was found that the skewness (pre-test=-1.362, post-test=-0.309) and kurtosis values (pre-test=0.464, post-test=-0.658) of the pre-test and post-test rubric scores after transformation were between -2 and +2 for participants in the control group. Due to the skewness and kurtosis values being between -2 and +2, it was determined that the pre-test and post-test rubric scores of participants in the control group were normally distributed after square root transformation.

For participants in the experimental group, it was found that the skewness (pre-test=-1.647, post-test=1.137) and kurtosis values (pre-test=0.833, post-test=1.479) of the pre-test and post-test rubric scores after transformation were between -2 and +2. Due to the skewness and kurtosis values being between -2 and +2, it was determined that the pre-test and post-test rubric scores of participants in the experimental group were normally distributed after square root transformation.

**Table13. Assessment of pre-test and post-test rubric scores of participants in the control and experimental groups.**

| | Control Group (N=10) | | Experimental Group (N=10) | | t [a] | p |
|---|---|---|---|---|---|---|
| | X ± SS | M (Min - Max) | X ± SS | M (Min - Max) | | |
| Pre Test | 4,30 ± 1,16 | 5,00 (2 - 5) | 3,50 ± 1,43 | 3,50 (1 - 6) | 1,372 | 0,187 |
| Post Test | 4,40 ± 9,97 | 4,50 (3 - 6) | 7,60 ± 1,51 | 7,00 (6 - 11) | -5,657 | **0,000*** |
| **t [b]** | -0,287 | | -10,077 | | | |
| **p** | 0,780 | | **0,000*** | | | |

The pre-test and post-test rubric scores of participants in the control and experimental groups were evaluated in the study (Table 13). According to the results obtained; the average pre-test rubric score of participants in the control group was 4.30 ± 1.16, and the average post-test rubric score was 4.40 ± 9.97; the average pre-test rubric score of participants in the experimental group was 3.50 ± 1.43, and the average post-test rubric score was 7.60 ± 1.51.

There was no statistically significant difference between the pre-test and post-test rubric scores of participants in the control group ($p>0.05$). However, there was a statistically significant difference between the pre-test and post-test rubric scores of participants in the experimental group ($t=-10.077$; $p<0.05$). It was found that the post-test rubric scores of participants in the experimental group were higher than those in the pre-test.

There was no statistically significant difference between the pre-test rubric scores of the control group and the experimental group ($p>0.05$). However, there was a statistically significant difference between the post-test rubric scores of the control group and the experimental group ($t=-5.657$; $p<0.05$). It was determined that the post-test rubric scores of participants in the experimental group were higher than those in the control group.

## DISCUSSION

This research investigates the impact of integrated Turkish and science activities on children's environmental perception. In the experimental group, children were exposed to integrated Turkish and science activities with an environmental theme. The increase in the variety of codes (+16) used by the children in the experimental group in describing environmental pictures and in their drawings in the post-test may indicate a positive impact of the activities on children's environmental perception. It is believed that the pictures used in children's books and the complementary words associated with these pictures contribute to enriching children's vocabulary. The fact that the words used by the children in the final test drawings were related to the books they read supports this notion. For example, Child $D_5$ depicted an event from the book "Minik Tohum" and used the following expressions to describe his drawing: "The girl came to collect garbage. As the rain falls, the seeds grow. One of the seeds remained under the leaf. The sun cannot reach it. So, the seed cannot grow." This finding is consistent with the study by Breitfeld et al. (2021), which suggests that children remember the details of the story and learn new words after reading picture books. Reisberg and Han (2009) also suggest that the images in picture books enhance children's visual culture and help them understand complex messages, thus developing environmental awareness. Çer (2016) argues that a visual that captures a child's interest in a book can enhance their ability to draw. The increase in the number of codes from 59 in the pre-test to 92 in the post-test in the experimental group aligns with existing literature. Therefore, it is expected that picture books should be used more frequently in homes and educational environments to support the cognitive and language development of preschool children and prepare them for literacy when they start elementary school. The results of this study emphasize the importance of meeting this expectation.

The experimental group showed an increase in the frequency of living organisms from zero in the pre-test to various organisms such as seeds, birds, flies, dogs, cats, chickens, flamingos, and giraffes in the post-test. Abiotic elements identified included lakes, tree roots, the moon, and stars. Based on these findings, it can be said that integrated Turkish and science activities have contributed to the development of environmental perception in the experimental group.

In a study by Gonzalez et al. (2010), preschool children were read books related to social sciences and science. The results showed an increase in the children's vocabulary related to science. It can be argued that achieving the desired outcomes through characters and images in children's books tailored to their developmental level would be easier for children. This is because characters in picture books are effective in shaping children's attitudes toward the environment (Çabuk et al., 2020). Within the scope of this study, it can be said that characters and events in picture books read to the experimental group have enhanced their environmental perception. Similarly, Polat (2021) found in his study that environmental education using picture books positively influenced children's environmental attitudes and views on the environment.

The structure of environmental-themed science activities can be presented to children through characters and plotlines in children's books, allowing children to identify with the characters and thereby enhancing their environmental awareness. It is believed that observations and experiments conducted in science activities encourage active participation in environmental issues among children. The darkening of the blue color tone in the final tests of the experimental group suggests an increase in children's environmental awareness. Considering that the integrated activities applied to the experimental group are likely the cause of this change, it can be said that the content of the activities affects children's environmental awareness. When integrated Turkish and science activities are evaluated within the scope of environmental education, as also emphasized by Güzelyurt and Özkan (2019), directing children towards activities where they can see results, conveying the idea that they can do something for the environment, and increasing children's environmental consciousness are important. The use of illustrated children's books in environmental education contributes to children's scientific development and helps them understand their surroundings by enabling them to identify with the characters in the books (Hsiao and Shih, 2015). The emphasis on human figures and their impact on the environment in the final test drawings of the experimental group may indicate that the activities have prompted the idea of active participation in environmental issues in children's minds.

Illustrated books can enhance children's drawing abilities and facilitate the expression of schemas in their minds. It is believed that visuals related to the environment in books can influence children's environmental perceptions. Fang (2018) argued that the visuals in illustrated books develop children's imagination and provide them with an aesthetic experience. According to Senokossoff (2013), the visuals in illustrated books facilitate children's connection with the text. Additionally, it is thought that children can improve their drawing abilities by seeing and examining the same figure drawn differently in illustrated books. Evaluating what children draw and using their drawings to understand their inner worlds can be an alternative assessment tool for researchers. Flowers et al. (2015) stated in their study that drawings are an effective tool for evaluating the results of environmental education given to individuals. Illustrated children's books are considered as valuable material that can enhance children's drawing abilities and broaden their horizons. Similarly, in a study by Cainey et al. (2012), the reason for the significant presence of book-related drawings in pre-trip and post-trip evaluations of children's drawings to measure the impact of an aquarium trip was attributed to the influence of visuals in books on children's drawing skills. It is believed that the visuals in

illustrated books guide children in expressing their emotions and thoughts and that the improvement seen in the final test drawings of the experimental group in the study is related to the illustrated books read.

Considering that environmental education aims to develop children's perception, attitude, and awareness of the environment, it is known that children's participation in these educations is crucial for a sustainable future. It is believed that not only the educational environment but also the attitude of the family is important in the failure of these educations to achieve the desired goal. Sawyer (2013) attributed children's non-participation in environmental activities to the lack of parents who could serve as role models for children, emphasizing the importance of parents placing importance on environmental education to develop environmental paradigms. In this context, the fact that the environmental perceptions of some children in the experimental group may not be at a higher level could be related to the family's perspective on the environment.

In the conducted study, it is observed that both the control and experimental groups frequently included human elements in their pre-test drawings. Children perceive humans as part of the environment. This finding is consistent with similar studies (Özsoy, 2012; Fraijo-Sing et al., 2020). Children considering humans as part of the environment may imply that they perceive human impact on the environment to be significant. This is evident in the final test drawings of the experimental group, where children (n=3) divided the paper into two parts, drawing a dirty and clean environment and associating the cleanliness of the environment with human elements. Hsiao and Shih (2015) also found in their study that after reading illustrated books to children, their drawings frequently included human and house figures. Similarly, Yurttaş (2023) investigated children's perceptions of environmental issues and found that children perceived littering, environmentally irresponsible activities, and negative human influence as the causes of environmental problems. In this regard, the integrated activities conducted in the research may have facilitated children's recognition of the connection between the human factor and the environment. It can be argued that the events experienced by characters in the read illustrated books and the complementary science activity provided an environment for children to think in this way. Additionally, the changing climate conditions and human-induced destruction in nature over time may have created an perception among children in early childhood that humans can dominate the environment and natural life.

Some children in the experimental group (n=7) mentioned in their final test drawings that the human factor was responsible for polluting the environment and that this pollution affected other living beings (plants and animals). The fact that this environmental pollution is of human origin is noteworthy. This attitude of children in the experimental group may indicate a sense of responsibility towards nature. Environmental education is concerned with teaching children to take responsibility and care for their immediate and distant environment (Dighe, 1993). Similar studies have also found that preschool children identify the source of environmental problems as the human factor (Tarman and Kükürtçü, 2022; Güngör et al., 2023).

The human factor is prominent in the environmental drawings of children in both the experimental and control groups, including in pre- and post-tests. Drawings then depict a place where plants and animals live. Despite various definitions of the environment in studies involving different age groups, the environment is predominantly expressed as a place where plants and animals live (Shepardson et al., 2007). In Tarman and Kükürtçü's (2022) study, children did not include the human factor in their drawings depicting their perceptions of nature. The findings of the study in this regard differ from the literature.

In their study, Shepardson and others (2007) categorized children's mental models about the environment into four categories, and model 3 was defined as a place influenced or altered by human activity or intervention, ranking third in frequency within the scope of the study. In this context, both groups (experimental and control) emphasizing the human element in their pre-test environmental drawings may be related to the age group of the children. As children's age increases, they may pay more attention to natural elements regarding the environment and may perceive the environment more as nature itself. Additionally, the tendency of the experimental group to predominantly depict the environment as dirty or clean due to human influence in their final test drawings is consistent with the study conducted by Shepardson et al. (2007). The frequent use of the human factor in children's drawings may indicate that children perceive humans as an integral part of the environment.

When book reading activities and hands-on activities are integrated, misconceptions in children can be corrected (Leung, 2008). It is noteworthy that in the pre-test interviews, children in both the experimental and control groups indicated trees as inanimate objects. However, it was observed that the misconceptions of the children in the experimental group, where integrated Turkish and science activities were implemented, were corrected in the post-test interviews. Integrated activities are thought to be effective in achieving outcomes in preschool education. In a study by Yıldız and Akman (2022) with preschool teachers, teachers stated that they mostly incorporate integrated activities in the process of imparting pattern acquisition skills to children.

It is believed that the reason for the positive changes in children's environmental perceptions is the practical nature and active participation required in the integrated Turkish and science activities within the content of integrated activities. Burke and Cutter Mackenzie (2010) state that education provided with picture books develops children's motivation for active participation in the environment, enhances ecological literacy along with visual literacy skills, and enables children to gain environmental awareness. Reading picture books to children can contribute to the development of constructive behaviors regarding their surroundings, sensitivity to environmental issues, and proposing solutions (Suh, 2022). Children gained experience through hands-on activities during the activities, which led to an increase in environmental awareness among the children in the experimental group. Similarly, in a study conducted by Kos et al. (2016) with preschool children, involving children in hands-on activities enabled them to understand the causes and effects of their behaviors on the environment. Parallel to the conducted study, Duran (2023) argues that when environmental education is implemented with an interdisciplinary approach, more effective results can be achieved.

In the study by Cheng and Monroe (2012), the perceptions of 80 fourth-grade children towards nature were grouped around the titles of enjoyment of being in nature, respect and love for all living things in nature, being integrated with nature, and sense of responsibility. In the interviews conducted with children, when asked the question "Do you love the environment? Why?" children responded with "I love the environment because; we play games, have picnics, and there are animals in the environment." This inference might suggest that children are willing to spend time outdoors and play games. Children may have thought this way because they can play original games without restrictions in the environment and feel free in the environment/nature. Parallel to the findings of the study, Ewert et al. (2005) stated that children mentioned spending time outside for fun and to fill their leisure time. The interviews conducted about children's drawings largely provided insights into children's enthusiasms and interests. For example, child $D_{10}$ stated the reason for loving the environment as "because I love growing flowers." Most children stated that they love the environment because they can play games in it. Lucas and Dyment (2010) concluded that children aged 5-12 prefer green and natural areas for playing. Children's freedom in nature, nature providing resources for them to play, and nature being able to respond to individual differences may have influenced their ideas. When adults listen to children's narratives about their drawings, they can learn about the child's culture, perspective, interests, and enthusiasms (Coates and Coates, 2006). In the study, while children largely stated "spending time outdoors/in nature/outside" as the reason for loving the environment, there was no relationship found between children's emotional attachments to the environment and their perceptions of the environment. This is because the reasons for loving the environment of children in both the experimental and control groups remained unchanged in the pre- and post-interviews, sticking to the same themes.

In the pre-tests, children cited spending time outdoors and playing outside as reasons for loving the environment. Similarly, in the study conducted by Cengizoğlu et al. (2022), children reflected the environment as a place to enjoy life in their drawings. Children stated that they loved the environment because they could have a good time and enjoyed the outdoors during the pre-test interviews. This finding is supported by the study of Ojala (2018): In the study, children's desires and ideas regarding environmental education in the forest were obtained, and the children requested an increase in the time spent in the forest. In the relevant research, children described the forest as a peaceful place (Ojala, 2018). The reason for this could be that in nature, children can use all their senses (Levonen, 2009). How individuals perceive themselves is closely related to the emotions and thoughts aroused by stimuli in the environment. The drawings made by children are a form of art. Art can be considered as the expression of knowledge acquired through sensation (Yeşilyurt et al., 2020).

Barrable (2019) stated that environmental education contributes to children's connection with nature for sustainability and introduced a pedagogy called connection pedagogy, which includes various guidelines for this purpose. One of these guidelines is 'developing compassion for non-humans,' which was included in the study. In the study, children cited 'feeding animals' as a reason for loving the environment. This may indicate that children harbor compassion for living beings in the environment. However, the responses of children to this question did not change between the pre and post-tests. The fact that children in the research sample reside in a green, nature-immersed environment may have influenced their thinking in this way and contributed to the consistency of their ideas even after the education provided.

According to Tahta (2010), science activities should not teach children concepts but should rather enable them to construct their own concepts. Literary texts contain values related to life and humanity and contribute to the development of the individual's affective behaviors in communication (Sever et al., 2011). In the activities implemented within the scope of the study, the content of picture books was reinforced with science activities, focusing on enabling children to establish a connection with daily life through activities. The fact that the experimental group drew figures related to daily life in their post-test drawings can be seen as a sign that children discover knowledge and form their own concepts. It can be said that integrated Turkish and science activities enhance children's ability to create concepts and their environmental perception. In a study conducted by Kurt Gökçeli (2022), it was stated that an environmental education program integrated with language activities has a positive effect on children's environmental awareness. Considering that an enhanced environmental perception will also lead to a positive attitude and awareness towards the environment, it is considered important to determine and improve children's environmental perception.

In early years, children perceive the environment as a place, while in later years, they perceive the environment as an interactive space where living and non-living entities interact (Loughland et al., 2002). The responses of children to the question "What living and non-living things are there in your environment?" in interviews are closely related to the entities present in the environment where the interview is conducted. In this context, the findings of the study align with the findings of Loughland et al.'s study.

Considering that integrated Turkish and science activities in the research have contributed to the development of children's environmental perception, it can be said that the concept of the environment can be imparted to children through illustrated children's books. Hansson et al. (2020) also concluded in their study with young children that book conversations are a good tool for imparting the nature of science to children. In this context, the study is parallel to the literature. Gülay and Ekici (2010) have advocated for enriching environmental education activities by bringing together various branches and disciplines of science. In the research, Turkish and science disciplines were integrated within the context of environmental education to enhance children's environmental perception.

Literary texts enable children to develop their unique emotions, thoughts, behaviors, and perspectives. This can be effectively used as a tool to give children a sense of responsibility in thinking (Sever et al., 2011). The increase in tree figures in the drawings of the experimental group in the post-tests of the study may indicate that children are paying attention to the tree element in the

environment. It can be said that integrated Turkish and science activities are effective in increasing children's interest in trees. In other studies, it has been concluded that stories are an effective tool for conveying and highlighting the importance of trees to children, and an increase in children's willingness to participate in tree planting activities has been observed after reading stories (Hadzigeorgiou et al., 2011). In the study, the experimental group drawing the roots of the trees in their post-test drawings and changing the drawing of the tree based on whether the environment is dirty or clean may indicate that children have reached a certain level of awareness regarding trees.

In environmental education, rather than simply imparting existing knowledge to children, environments should be created where children can develop themselves based on their potentials (Alerby, 2000). In the conducted study, attempts were made to enhance children's environmental perception using picture books. Children were given the opportunity to examine picture books before and after reading, enabling them to follow the content through pictures. Indeed, the visuals and texts in picture books help develop children's visual literacy (Batič, 2021). Science activities related to the content have contributed to children's development in terms of their environmental perception.

Alerby (2000) found in his study that young children describe and draw their immediate surroundings as their environment. The conducted study is consistent with this finding. When asked the question "What living and non-living things are there in the environment?" to both the experimental and control groups, children provided examples from the objects in the classroom where the interviews were conducted.

During the activity implementations in the study, it was observed that some children initially showed little interest in the books being read but became more involved in the science activity part of the process. While each discipline has its own unique characteristics, incorporating different disciplines into educational environments is thought to better accommodate children's preferences stemming from individual differences in activities. In this context, integrated activities are considered an effective type of activity to attract children's interest (Benli et al., 2022). The enriched structure of integrated activities can be used as an effective method to involve all children in the activities. Thus, each child can find a piece of themselves in the activity. It can be said that within the scope of the research, integrated activities type is effective in attracting the attention of children.

The integrated Turkish and science activities in the study successfully captured the interest of the children, who actively participated in the activities. This outcome can be attributed to the designed activities emphasizing various aspects of the environmental concept. Providing environmental education to children with an interdisciplinary approach allows the advantages of the disciplines used to be utilized (Sever & Yalçınkaya, 2018). The increase in shades of blue in the post-tests of the children in the experimental group may indicate that they embraced the activities and acquired the gains and indicators in the activities. The use of different methods in environmental education attracts children's interest and increases their willingness to participate in educational environments (Ojala, 2018). Research has shown that integrated Turkish and science activities are effective in the development of preschool children in various science topics (Yıldız et al., 2019). In Doğanay Koç's (2022) study, it was concluded that integrating book reading activities with science activities enhances children's problem-solving behaviors, thereby making them more environmentally aware. Similarly, in the conducted research, integrated Turkish and science activities helped children develop their environmental perceptions. This result may be related to the closeness of science activities to real life and the ability of life experiences in children's books to impart a sense of reality to children (Koç, 2021). The inclusion of events from real life in the drawings of the children in the experimental group in their post-tests and their ability to express their drawings better can be considered as indicators of this situation.

Environmental education is known to be an opportunity to achieve sustainable development goals (Tyyskä, 2018; Seppälä, 2022). In the conducted research, it can be said that environmental education has achieved its goals in the context of sustainable development for children. The ability of the children in the experimental group to distinguish between dirty and clean environments and to draw pictures considering living elements in the environment after the implemented activities is indicative of this situation. However, Coquidé (2019) argued that providing education for sustainable development at an early age is not a good idea because preschool children may not have reached the necessary level of cognitive development. This idea differs from the results of the conducted research. Because the environmental education provided in the study was prepared according to the developmental level of the children, and the expected development was achieved in the experimental group as a result of the research.

While reading books appeals to children during early childhood environmental and sustainable development education, their concentration may sometimes be insufficient (Lukkarinen & Peltola, 2018). Therefore, it is believed that supplementing and integrating children's books with different activities will increase their use in early childhood environmental education. The results of the research support this idea.

When planning activities for early childhood, it is important to consider a rich language environment, richness in expressions, the child and their environment, environmental exploration-learning, and individual differences in the child's development (Seppälä, 2022). It is observed that these learning areas are present in the structure of integrated Turkish and science activities and that these activities are effective in the development of children's environmental perceptions. Additionally, the enrichment of the content of the responses given by the children in the experimental group in the final interviews can be considered as an indicator of this situation. For example, while the child with the code $D_{10}$ answered "I don't know" to the question "What is the environment?" in the initial interviews, they answered the same question in the final interviews by saying "It's flowers, trees. It's where animals are."

The diversification of the words used by the children in the experimental group when describing their final drawings also indicates that integrated activities affect children's learning areas. Dowdall et al. (2020) argued in their study that book reading activities have insufficient short-term effects on children's language development. In this context, the research contradicts the literature. Because the development of expressive language skills of the children in the experimental group is evident from the answers they gave to interview questions in their final tests.

During the preschool period, stories activate children's cognitive structures and influence their perception processes (Ahi et al., 2014). In the research, the plotlines in the picture books used were integrated with science activities to enhance this aspect of picture books. It is thought that the proximity of the topics in picture books to real life facilitated the integration of activities. The fact that the children in the experimental group reached darker shades of blue in the post-test indicates that integrated Turkish and science activities increased children's environmental perceptions. Therefore, teachers are expected to support the stories in the classroom picture books with different activities after reading (Özdemir et al., 2019).

It is noteworthy that children in both the experimental and control groups categorized trees as lifeless in the pre-tests. However, after the Turkish and science activities applied to the experimental group, it was observed that they categorized trees in the living category. The statement of child $D_2$, "trees cannot walk or talk, so they are lifeless," and the statement of child $K_7$ in the post-test, "those that walk are alive," may stem from children associating the concept of living with the action of movement. This finding aligns with the study conducted by Villarroel and Infante (2014), where children struggled to categorize trees as living, citing reasons such as the slow growth and sturdiness of trees. The study thus parallels the existing literature in this regard.

The fact that children in the experimental group categorized the tree as lifeless in the pre-tests and used the sun figure less in their pre-test drawings may be associated. Children coded as $D_1$, $D_2$, $D_3$, and $D_6$ categorized the tree as lifeless in the pre-test, while in the post-test, they categorized the tree as alive and also drew the sun figure in their pictures. Similarly, the fact that children coded as $D_2$, $D_3$, $D_4$, $D_5$, $D_8$, and $D_{10}$ drew rain and cloud figures in their post-test drawings may be associated with seeing trees in the alive category. Drawing sun and rain/cloud figures in their pictures simultaneously also coincides with the findings of Villarroel and Infante (2014). In the relevant study, children who were able to make the living-nonliving distinction well and were aware that plants were alive included more sun figures in their pictures.

Shepardson et al. (2007) state that as children gain experience with educational environments, their knowledge increases, and they form different mental models about the environment. The integrated activities implemented within the scope of the study also provided positive changes in children's mental models.

In the study, the increase in environmental perception among children in the experimental group can be explained by the integrated Turkish and science activities. It is believed that the integration of picture books used in the activities with different disciplines played a role in this increase. Muthukrishnan (2019) also found positive outcomes of using picture books in environmental education with first-grade students. In this context, it is suggested in the study to integrate picture books into the curriculum to create a versatile environment when using picture books in environmental education. Güzelyurt and Özkan (2019) argue that in environmental education given using children's books, beyond simply conveying examples related to the topic covered in the book, the education should be made practical to make it a lifestyle for children. When providing environmental education in the preschool period using picture books, the positive feedback of using picture books can also be understood by children grasping the environmental-themed messages in the picture books and incorporating these messages into their drawings (Hsiao and Chen, 2015).

The integrated activities implemented in the experimental group in the study enabled children to express their drawings better in the post-test. While describing their drawings in the pre-test, children used shorter sentences, whereas in the post-test, their expressions about the drawings were clearer and more explicit. Additionally, children in the experimental group were able to explain the connections between figures more easily in the post-test. For example, child $D_1$, who drew independent figures of a house and a rabbit in the pre-test, established connections between humans and flowers in the post-test, depicting the effect of humans on flowers by illustrating "humans watering the flowers and the flower growing." Presenting the curriculum topics in integrated form in preschool education can lead to more realistic results regarding children's development while also promoting development in various areas for children (Öztürk Yılmaztekin and Tantekin Erden, 2017). Evaluated within this framework, it can be said that children in the experimental group showed improvement in language and cognitive development areas after the implementation of integrated activities. The targeted achievements and indicators related to cognitive, socio-emotional, language, motor development areas, and self-care skills were largely acquired by children through the implemented activities. Considering the drawings children made, their narrative descriptions of the drawings, and their performance during the activities, this conclusion can be drawn. The multidimensionality of the environmental subject enables children to develop in various areas through the implementation of environmental education (Séguélas, 2020).

The structure of environmental education, which can bring together different disciplines and reflect this feature in educational environments, also positively influences the outcomes of environmental education (Staples et al., 2019). In the conducted study, the integration of Turkish and science activities as different disciplines in the experimental group led to a difference in the post-tests compared to their pre-tests. The lack of difference in the post-tests compared to the pre-tests in the control group may emphasize the importance of integrating different disciplines in environmental education. Arredondo Velázquez et al. (2018) concluded in their study with elementary school students that textbooks are not sufficient to teach environmental issues to children; it is necessary for the connection and interaction with nature to be strong in order to impart environmental gains to

children. In this context, integrating Turkish activities with science activities in educational environments can be considered as a good method for imparting environmental topics to children. Implementing this proposed method in different grade levels has yielded positive results, and in the experimental group of the relevant study, scientific literacy skills have improved (Yuliana et al., 2021).

## CONCLUSION AND RECOMMENDATIONS

Using the flexible structure of the preschool program, environmental education can be conducted through various activities (Gülay & Ekici, 2010). This research emphasizes the importance of providing environmental education by bringing together different types of activities rather than drawing a boundary for environmental education. The environment is life itself. It is clear that setting such a boundary is impossible and would not be beneficial.

Environment is a continuous practice where values, facts, and principles governing human life evolve (Epiquén et al., 2019). The continuity of environmental education necessitates its continuation at home. The inability to elevate the environmental awareness acquired by children through the environmental education given in the study may be due to the lack of parental support in environmental education. The lack of involvement of parents in these educations may hinder the continuity of these factors (such as security factor) for children and parents (Fisman, 2005).

Despite the children in the research sample residing in a district closely connected with nature, their limited inclusion of natural environment-related facts, events, and factors in their pre-test drawings may indicate that children are not fully aware of their natural environments. Similarly, Sanchis et al. (2022) concluded that children have trouble perceiving natural areas in their immediate surroundings as part of the environment. In light of this assessment, it is recommended to create opportunities for children to recognize natural areas in their environment and spend more time in these natural areas.

Based on the results obtained within the scope of the research, the following recommendations have been proposed:

- Environmental-themed picture books should be included in the environmental education process, and children should be given the opportunity to examine these books and imitate reading through the books.
- Picture books for children can be integrated with various activities, not just read.
- The picture books read can be reinforced by associating them with daily life.
- The contributions of picture books for children can be conveyed to parents through family education sessions, raising awareness among families about children's picture books.
- Environmental-themed picture books can be added to classroom libraries for use in environmental education.
- Studies can be conducted to determine the changes in environmental awareness according to age and gender variables.

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### Statements of publication ethics

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

### Researchers' contribution rate

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

### Ethics Committee Approval Information

In this study, the ethics committee permission was obtained from Kastamonu University Social and Human Sciences Ethics Committee with the decision dated 07.11.2022 and numbered 20.

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