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Developing Preschool Students' Awareness of Living Things: Fungi in Nature

Ferhat Karakaya [1*], Seyda Bozkurt [2], Mehmet Yilmaz [3]

[1] Yozgat Bozok University, Yozgat, TURKEY
[2] Zonguldak Eregli Terzi Primary School, Zonguldak, TURKEY
[3] Gazi Faculty of Education, Gazi University, Ankara, TURKEY
***Corresponding Author:** ferhatk26@gmail.com

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ABSTRACT

In the research, it was aimed that children in the age group of 4-6 discover a different group of living things (fungi) living in addition to the plants and animals around them and to develop their awareness of living things. In addition, the study examined the effect of the activities prepared at the nature observation center on the cognitive and linguistic development of children. The research using the case study was carried out in the 2021-2022 academic year. The study group of the research consists of 6 (six) different participants who studied in a preschool educational institution in the Black Sea Region of Turkey in the age group of 4-6 years. The research was carried out with a holistic understanding that included different activities and evaluation processes, both in and out of the classroom. Semi-structured interview forms developed by the researchers were used to collect the data. As a result of the research, it was determined that nature-based observations and activities have a positive effect on the awareness of children in the 4-6 age group about living things. In addition, it was concluded that cognitive and linguistic development was achieved in children aged 4-6 years. In addition, the research concluded that the activities prepared at the nature observation center provided cognitive and linguistic development in children in children aged 4-6 years.

Keywords: environmental education, preschool education, fungi

INTRODUCTION

Mushrooms sprouting on a lawn, mushrooms tightly stacked on a tree like small shelves, mushrooms purchased from markets to consume as food, or fuzzy mold spots on leftover food are the most common members of the fungus kingdom, which attract everyone's attention. Biologists studying fungi around the world have described around 120,000 species. However, recent metagenomic studies have shown that this number may exceed 1.5 million. For this reason, studies on the classification of fungi continue. Most people are familiar with caps, molds, and some fungi, including yeasts (Hawksworth et al., 1995; Sadava et al., 2014; Simon et al., 2016; Taylor et al., 2018). Many systematic studies have been carried out on macrofungi in Turkey and significant progress has been made, especially in recent years. With these studies, new mushroom species have been added to the world literature (Isiloglu et al., 2010; Taskin et al., 2016).

Ecosystems collapse if mushrooms fail to decompose dead organisms, fallen leaves, feces, and other organic matter. Mushrooms return chemical elements of vital importance to the environment in forms that other organisms can assimilate. Besides these ecological roles, mushrooms have been used in various ways by humans for centuries. We consume mushrooms (for example, cap mushrooms and very expensive truffles), we use them in agricultural and forestry applications, we culture them to produce antibiotics, we add them to dough to make bread rise, we add them to milk to produce various cheeses. We also use it to make beer and wine. However, it is also true that some mushrooms cause disease in plants and animals (Sadava et al., 2014; Simon et al., 2016; Urry et al., 2017). Although mushrooms can only grow in forests and moist areas in abundance, it is possible to come across mushrooms all over the world because they are cosmopolitan creatures (Petersen, 2012). When asked whether members of the fungal kingdom are more closely related to animals or plants, it is known that most people choose plants. The reason for this misconception is that fungal studies, called mycology, were carried out by scientists (botanists) who also studied plants. Early classification systems placed both plants and fungi in the same groups, mainly because they were immobile, had cell walls, and shared other similar characteristics. However, these explanations are wrong. Because fungi do not have chloroplasts and cannot perform photosynthesis. Since fungi do not contain chlorophyll, they cannot independently form organic substances such as sugar, oil and starch. Therefore, they need other living things (Mader & Windelspecht, 2018; Simon et al., 2016). Although fungi are chemoheterotrophs like animals, they are not animals.

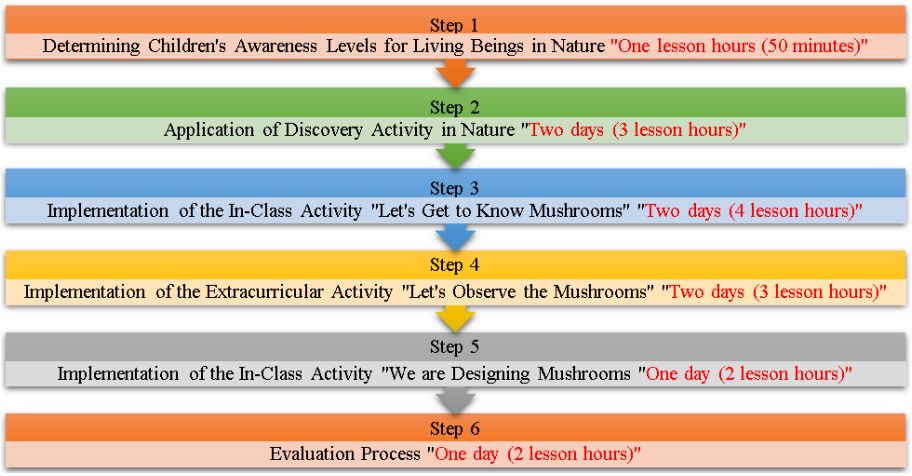

Figure 1. The process of the research

Considering the global environmental problems experienced in recent years, the importance of raising individuals with high awareness of living things emerges. Family and pre-school education is at a critical point in order for children to have a high level of environmental awareness and sensitivity (Gok & Afyon, 2015). The training of individuals with a high level of awareness towards living things and the environment should be started from the pre-school education level. Because the experiences gained by the child in early childhood regarding science education prevent the education-teaching process to progress smoothly and the formation of misconceptions about science concepts (Brenneman, 2011). In this context, it is necessary for individuals to create their own knowledge and learn by doing and living (Huseyinbas et al., 2021). In order to provide a permanent environmental education and to acquire environmental-based gains, it is necessary to have practical trainings that progress from close to far (Louv, 2018) and include context-based learning processes (Akcadag Karakaya & Cobanoglu, 2018; Fisman, 2005). Because context-based learning enables students to perceive events/phenomenons they encounter in their immediate environment with their experiences (life and experience), and enables them to produce solutions to developing problems (Glynn & Koballa, 2005; Kutu & Sozbilir, 2011).

The methods, materials and appropriate activities used in preschool education are important in order to transfer scientific knowledge to children correctly (Trnova & Trna, 2015). Activities based on nature observations and practices can increase students' connections with living things and provide their cognitive development (Kinchin, 2019). According to Ozdemir (2017), educational content for nature observation should be developed and student participation in these trainings should be increased so that students can connect with living things. In this context, it is thought that the preparation and implementation of activities for living awareness, taking into account the nature observations and the achievements (cognitive and linguistic development) in the preschool education program, are important for the literature. In addition, it is important for the future for preschool children to correctly interpret the mushroom samples they meet for the first time, and to acquire accurate information about their functions in the sustainability of their habitats and ecosystems.

In the research, it was aimed that children in the age group of 4-6 discover a different group of living things (fungi) living in addition to the plants and animals around them and to develop their awareness of living things. Besides, the effects of the activities prepared in the nature observation center on the cognitive and linguistic development of children were examined in the study.

METHOD

Research Pattern

Case study refers to the detailed explanation of the situation or events that occur in a system (Creswell, 2007). The greatest benefit of case studies is that they focus on a multifaceted and in-depth study of the topic that is desired to be investigated. In this research, it was investigated in many ways that children in the age group of 4-6 discover fungi by observing their life in nature.

Study Group of the Research

The research was carried out in the academic year 2021-2022. The study group of the research consists of six different participants who studied in a preschool educational institution in the Black Sea Region of Turkey in the age group of 4-6 years. The study group of the research consisted of 83.3% (N=5) female and 16.7% (N=1) male participants. In the research, the volunteerism of the participants was taken into account. The process of the research, taking into account the ethical rules, was described in detail to the participants and their parents. In addition, parental consent was obtained from the parents of each participant.

The Process of Research

The research was carried out with a holistic understanding that included different activities and evaluation processes, both in-class and out-of-class. The process of the research is given in **Figure 1**. A lesson hour in pre-school education is 50 minutes.

Table 1. Acquisition and indicative contents of events

Activity name	Development area	Gains	Indicators
Discovery activity in nature	Cognitive development	Pays attention to the object/situation/event	He/she focuses on the object/situation/event that needs attention. Asks questions about the object/situation/event that draws his/her attention. Describes the object/situation/event that caught his/her attention in detail.
		Makes a prediction about the object/situation/event	He/she tells its prediction about the object/situation/event. Examines the real situation.
		Observes objects or entities	He/she tells the name, color, shape, size, length, texture of the object/entity.
Let's get to know mushrooms	Language development	Understands the meaning of what they listen/watch	Fulfills verbal instructions. Explains and comments on what they are listening to/watching.
Let's observe the mushrooms	Cognitive development	Pays attention to the object/situation/event	He/she focuses on the object/situation/event that needs attention. Asks questions about the object/situation/event that draws his/her attention. Describes the object/situation/event that caught his/her attention in detail.
		Compares the properties of objects or entities	Distinguish and compare the colour, shape, size, length and texture of objects/entities.
We are designing mushrooms	Cognitive development	Compares the properties of objects or entities	Distinguish and compare the colour, shape, size, length and texture of objects/entities.

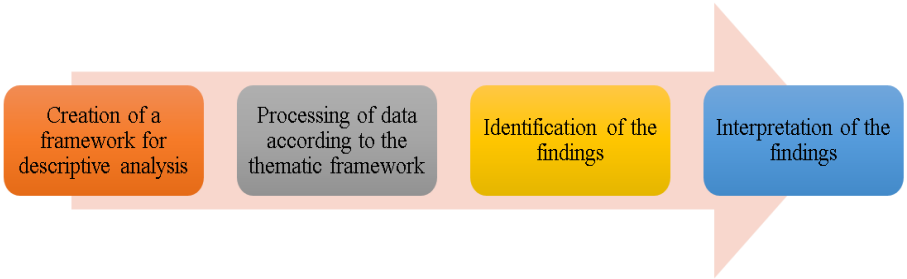

Figure 2. Data analysis process (Yildirim & Simsek, 2018)

Events and Contents

Four different activities were developed taking into account the goals and objectives of the research. The activities were prepared taking into account the basic principles, achievements and indicators of the preschool education program published by the Ministry of National Education of the Republic of Turkey (MoNE, 2013). Opinions of two different field experts (Specialties: Environmental education and Fungi) were consulted in order to avoid scientific mistakes about the fungi included in the activities. In addition, the expert opinion of a preschool teacher who is actively working on the suitability of the activities prepared for children aged 4-6 years has been taken into account. The acquisition and indicative contents of the developed activities are given in **Table 1**.

Data Collection Tools

In the research, draft semi-structured interview forms with separate questions for the steps of the research process were developed taking into account the achievements and indicators of preschool education. The prepared draft forms are presented to the opinions of experts in terms of content, purpose and language. In accordance with the opinions of experts, the final version of the forms was created and applied as data collection tools within the scope of the research.

Data Analysis Process

Different methods and techniques are preferred in the analysis of qualitative data. Descriptive analysis and content analysis are very often known as preferred techniques in the analysis of qualitative data. Descriptive analysis is defined as summarizing and interpreting the data obtained using different data collection techniques according to predetermined themes (Yıldırım & Şimşek, 2018). In the descriptive analysis, the statements of individuals are presented by quoting in order to remarkably reveal the opinions of the interviewed or observed individuals. In this research, in order to directly reveal the observations and opinions of the participants, the data were evaluated using the descriptive analysis method. During the data collection process, the questions in the semi-structured interview forms were read by the researcher taking into account the age groups of the participants and the answers were recorded with a voice recorder. These records were transcribed and turned into written documents. The data analysis process of the research is given in **Figure 2**.

In order to ensure the internal reliability of the research, the data were evaluated by two different coders. For reliability, consistency between decoders was calculated using the formula Miles and Huberman (1994) [Reliability: Number of Opinions/(Number of Opinions+Number of Opinions)×100]. The reliability value was calculated as 95%. The coders then conducted a joint assessment to ensure reliability.

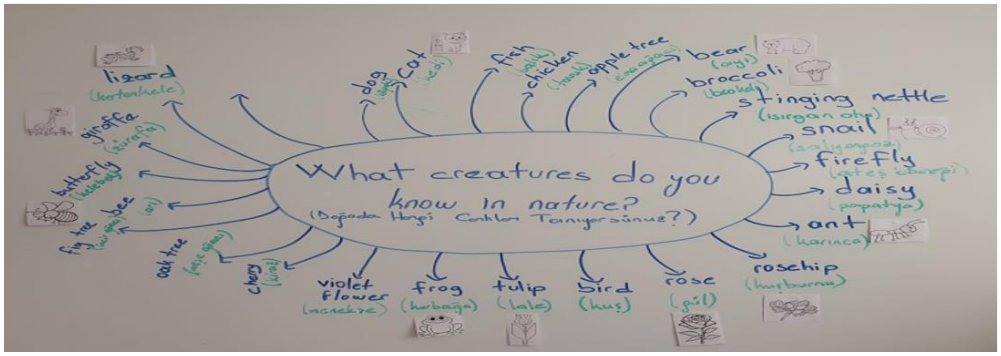

Figure 3. Living things that participants know in nature

Figure 4. Images of the participants' nature observations

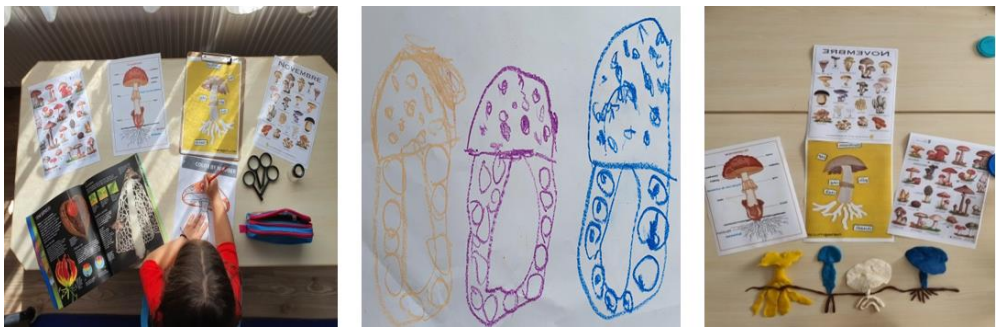

Figure 5. Images for the "let's get to know mushrooms" activity (Left: Visuals of participants reviewing scientific journals; Middle: Mushroom drawing of the participants; Right: Mushroom models of the participants)

RESULTS

In the research, the awareness levels of children in the age group of 4-6 towards organisms in nature were determined. The concept network for the findings obtained from the answers given by the participants is given in **Figure 3**. When the concept network given in **Figure 3** is examined, it is determined that children in the 4-6 age group have awareness of living things in the world of animals and plants in nature.

In the research, the awareness situations of children in the 4-6 age group about other living groups (fungi in this study) other than plants and animals were determined by observing nature. The images for the observation processes of the participants are given in **Figure 4**. When **Figure 4** is examined, it has been determined that children in the 4-6 age group have perceptions (interest and curiosity) about the fungi they see in nature, other than plants and animals, and they can perform observational processes. The teacher who managed the process expressed the curiosity and interest of the children in the following sentences:

> "I can say that children are excitedly examining species (fungi) belonging to the group of living things that they did not know before. I saw that the children made similar observations with their families during the process and shared these with their friends and me. In addition, I observed that the targeted gains in the preschool education program were achieved in children."

In the research, the effect of awareness activities for living creatures in nature on the formation of the "understands the meaning of what they listen/watch" acquisition in the pre-school education program was determined. In this context, the visuals of the practices carried out by the participants during the "Let's Know the Mushrooms" in-class activity are given in **Figure 5**. When

Figure 6. Images for the "let's observe the mushrooms" activity (Left: Structural comparison of mushrooms; Middle: Color comparison of mushrooms; Right: Length comparison of mushrooms)

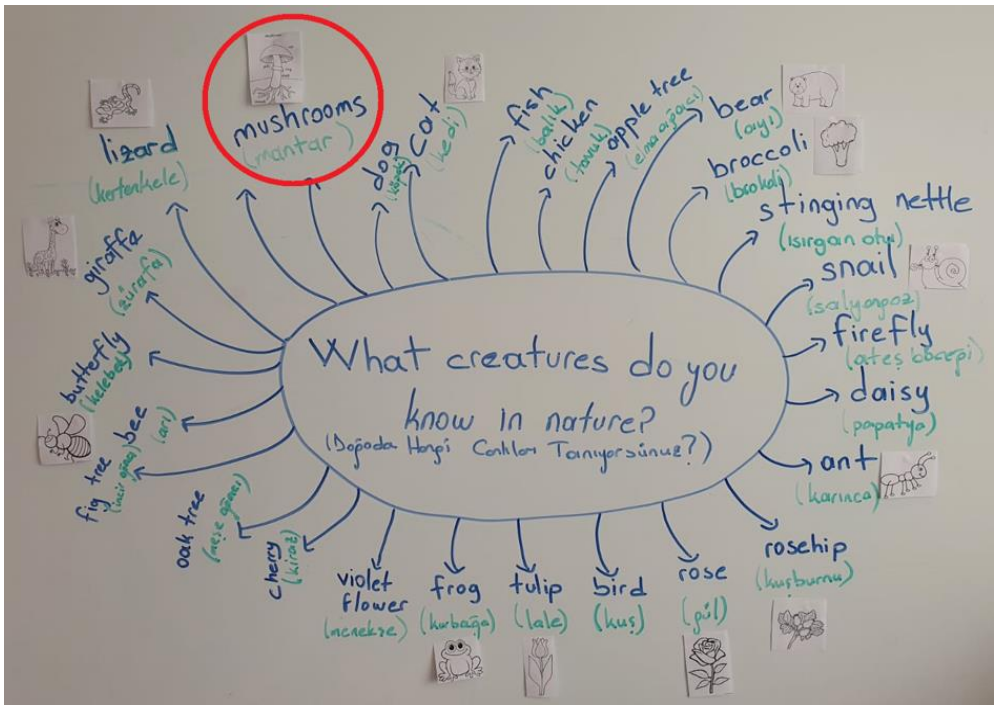

Figure 7. Creatures that participants know in nature

the visuals given in **Figure 5** are examined, it has been determined that during the class activity, Let's Know the Mushrooms, children in the 4-6 age group can create mushrooms models within the framework of what they listen to and watch.

In the research, the awareness activities for living creatures in nature, which is included in the preschool education program, "pay attention to the object/situation/event. Compares the properties of objects or entities." The effect on the formation of the gain was determined. In this context, during the "Let's Observe the Mushrooms" activity, the participants were asked about the color, shape, size, length and texture differences of the mushrooms. In addition, the observations of the teacher who directed the process towards the participants were determined. The visuals for the applications are given in **Figure 6**.

When the visuals given in **Figure 6** are examined, it has been determined that children in the 4-6 age group can distinguish the color, shape, size, length and texture differences of mushrooms. The observations of the teacher, who manages the process, about the let's get to know mushrooms activity process are given below:

> "Children correctly answered all the characteristics of mushrooms in terms of color, shape, size, length and texture. Considering the answers of the participants during the process, it can be said that all of the achievement and indicator values in the pre-school education program have been reached."

The effect of nature-based observations and activities carried out within the scope of the research on the awareness levels of children in the 4-6 age group towards living things in nature was determined. The prepared concept network is given in **Figure 7**.

When the concept network prepared after the nature-based observations and activities given in **Figure 7** is examined, it has been determined that children in 4-6 age group have an awareness of living things in the realm of kingdom, plants and fungi in nature.

Table 2. Opinions of the participants about fungi

Codes	Sample participant opinions
Morphological structure	S-1: There are roots (hyphae) under the fungi. It has a long stem. Fungi have caps. S-2: Fungi have many colors. There are orange, red, purple, white, yellow colors. Fungi have places of attachment under their soil. Fungi have stems. S-3: There are tulle on the fungi. S-4: There are different types of fungi. For example, Turkey tail mushroom. It has roots under the ground, has a stem and a cap. There are also lines under the cap of the fungi. S-6: Fungi have a long stem and a white cap.
Living space (Habitat)	S-1: He observed fungi in the garden near the headman's office. There was a fungus on the balance board in the backyard. S-2: We observed fungi in the backyard. Fungus had grown on all the woods. S-3: Fungi are formed in the soil in humid weather. It can also occur, especially in the spring. Fungi grow on wet logs. S-4: We observed the mushroom in the garden just behind the school. S-5: I saw the mushroom in the garden of the school. There were also trees. S-6: It was in the garden of the school.
The field of use of fungi	S-3: Some of the fungi are edible, but some cannot be eaten because they are poisonous. S-6: Some of the fungi are edible, some are not.

Figure 8. Images of the participants' nature observations

In the research, the opinions of children in the 4-6 age group about fungi were determined as a result of the observations and activities they made. Opinions of the participants about fungi are given in **Table 2**. When the findings in **Table 2** were examined, it was determined that the children in the 4-6 age group evaluated the mushrooms as morphological structure, habitat and usage area as a result of the observations they made and the activities carried out. The visuals of the mushroom observations made by the participants during the activities are given in **Figure 8**.

DISCUSSION AND CONCLUSIONS

In this research, it was examined the awareness of children in the age group of 4-6 for the species found in the fungi kingdom. As a result of the research, it was determined that the children in the 4-6 age group did not have awareness of the species in the fungi kingdom. It was determined that the participants knew only plant and animal species found in nature. According to these results, it can be said that the knowledge of children in the age group of 4-6 about living species is not at a sufficient level. When the literature is examined, it has been determined that there are national and international studies supporting the research findings. For example, in the research conducted by Huseyinbas et al. (2021), it was determined that secondary school students saw plants and animals and knew their names, but their awareness of fungi was not at a sufficient level. In the research conducted by Gok and Afyon (2015), it was determined that the environmental knowledge levels of primary school students were not at an adequate level. Meerah et al. (2010) emphasized that the knowledge levels of primary and secondary school students in Malaysia regarding biodiversity in the regions where they live are very low. As a result of the research conducted by Gulen (2020), it was determined that primary school students had misconceptions about the classification of living things and that they knew mushrooms as inanimate. Much work on students' misconceptions about plants not being living organisms has been carried out (Amprazis et al., 2021; Martínez-Losada et al., 2014; Villarroel & Infante, 2014). Conceptual complexity for living things is seen in early childhood (Margett & Witherington, 2011), but it is known that it can be corrected from the 6th age (Anggoro et al., 2005).

In the research, the effects of nature-based observations and activities on the awareness of living things in children aged 4-6 were examined. In addition, the effects of the activities prepared by taking nature observations into account in terms of cognitive and linguistic development in the preschool education program on children aged 4-6 were examined. As a result of the research, it was determined that nature-based observations and activities had a positive effect on the awareness of living things in children aged 4-6. As a matter of fact, the participants stated that there are species that are found in the kingdom of fungi, apart from plants and animals in nature. As a result of the research, it was determined that the participants were aware of the morphological structure, habitat and usage areas of the mushrooms. The teacher who conducted the activities stated that the activities prepared taking into account the species and nature observations in the realm of fungi increase their awareness of living things in children aged 4-6 years. In addition, within the framework of the prepared activities, it was concluded that cognitive and linguistic development was achieved in children in the 4-6 age group. According to these results, it can be said that nature-based

observations and activities have a positive effect on the awareness of living things and cognitive and linguistic development of children in the 4-6 age group. Educational experiences in nature in preschool and primary school enable individuals to gain awareness at an early age and establish a meaningful connection with nature (Kosker, 2013). Activities carried out using the travel-observation and examination method increase individuals' critical thinking skills, environmental awareness and sensitivity (Ozgel et al., 2018). Observations and trainings carried out outside of school are effective in increasing the personal development, social skills, environmental awareness and academic success of individuals (Lien, 2007). In addition, trips to out-of-school learning environments are important in terms of the development of students' knowledge, skills, socialization skills and the concretization of knowledge (Cepni & Aydin, 2015; Ocak & Korkmaz, 2018). When the literature is examined, it has been determined that there are national and international studies supporting the research findings. For example, in the study conducted by Wojciehowski and Ernst (2018), it was determined that nature-based activities have a positive effect on the development of creative thinking skills of preschool children. In the study conducted by Pereira et al. (2006), it was concluded that the activities that take nature education as a reference increase the awareness of students and teachers about the live distribution. The increase in students' interactions with living things causes the formation of correct perceptions about these creatures (Huseyinbas et al., 2021; Villarroel et al., 2018). According to Ultay et al. (2018), active participation of preschool students in activities is effective in developing positive interest and attitude towards science concepts. In the study conducted by Akcadag Karakaya and Cobanoglu (2018), it was stated that taking part in out-of-school activities was effective in students' displaying responsible behaviors at the point of protecting biodiversity.

As a result, pre-school education is critical for raising individuals with high awareness levels for living things. In order for pre-school teachers to manage their education processes with a holistic approach, sample activities including in-class and out-of-class practices should be brought into the literature. In addition, it can be said that the development of educational content in which children with preschool education can make nature observations will be beneficial to the literature.

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APPENDIX A-Preschool Education Program Daily Education Flow

Time to Start the Day

The teacher greets the children with a smile. “Which living creatures do you see when you go out into nature?” asks the question. A concept network is created with the answers from the children and hanged in the science and nature center of the class. The teacher draws attention to the temporary learning center he has created in the classroom. The temporary learning center created is defined as “Mushroom Study Center”.

Play Time

Children examine and play with toys and materials in learning centers.

Breakfast & Cleaning

The importance of nutrition is explained to the children and it is said that breakfast will be made soon. It is explained what needs to be done to meet the cleaning and toilet needs in the washbasin, and the children are guided during this time. Breakfast is made by reminding the food rules.

Event Time

- Integrated Movement and Nature Activity “Exploring Our Nature Classroom”

Time to Evaluate the Day

Going Home

Preparations are completed, the children are said goodbye.

General Evaluation

APPENDIX B- Discovery Activity in Nature

Activity Type: Integrated Large Group-Movement and Nature Activity
Learning process: The teacher tells the children that they will go for a nature walk and there they will discover a new creature other than plants and animals. Children get ready by wearing garden overalls and boots suitable for hiking. The teacher takes a magnifying glass and a lub as much as the number of children. The children are taken to the area where the mushrooms increased due to the rains the day before. The teacher asks questions while walking, allowing the children to look carefully around. For example:

- Which creatures do you see around us?
- Why might the leaves of this tree turn yellow?
- How many different trees and animals did we see?

When it comes to the area where the mushrooms will be observed, the teacher gives the following instructions to the children:

- "Guys, look around very carefully, if I say plant, I am not a plant, if I say animal, I am not an animal, I am a different species, guess what I am?"

In line with the answers from the children, the teacher begins to describe the appearance of the mushroom species in the area. Teacher; "Guys, my name is mushrooms. Would you like to review me? Let's see what I have?" says.

- Guys, let's see if this creature has leaves like flowers next to it. After the children gave the answer that they have no leaves, the teacher replied, "Yes, children, mushrooms do not have leaves like plants".
- Well, mushrooms weren't a plant, so could they be an animal? The question is asked? After the answers received from the children, the teacher says, "Fungi do not have the ability to move like other animals, so mushrooms are not animals either."

The found mushroom is examined by the children with a magnifying glass. At this point, the teacher asks the children the following questions:

- Guys, what's the name of this creature?
- What is the color of the mushroom we are currently examining?
- What shape is his hat?
- Can you show me the biggest cap mushroom here?
- Can you show me the longest stem mushroom here?
- What is the texture of the cap of this mushroom? Is it clean? Is it smooth? Is hairy?

After the mushroom observation and examination questions are completed, the teacher takes one of the mushrooms and the children are examined with the lub.