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ABSTRACT OF THE DOCTORAL THESIS

Investigating and Developing Ecological Behavior in Preschoolers through Interdisciplinary Approaches

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The present doctoral research thesis is structured into two parts: Theoretical Framework and Research Methodology. Conclusions and recommendations have been annexed to these two parts. The first part of the thesis, the Theoretical Framework, encompasses numerous topics of interest:

1.1. Justification of the chosen theme:

Humanity faces a series of local, regional, and global problems, one of the most significant being environmental degradation as a result of human activities. Air, water, and soil pollution, ozone layer depletion, global climate change, habitat destruction and fragmentation, species extinction, are some of the current and prospective ecological issues posing a major threat to the continuity of life on Earth. Young children will inherit the biosphere. Therefore, it is considered crucial for them to recognize the importance of all living organisms, not only due to their presence and appearance, but also based on their intrinsic value and multidimensional impact on human life as part of the living world and ecosystem functions (Wilson, 2002). However, children's knowledge, attitudes, and behavior regarding the interdependence between organisms have been little investigated in the context of early childhood education. Like other age categories, it is necessary for preschoolers to realize that environmental problems are global, affecting everyone, and that every negative action, no matter how insignificant it may seem, can destructively affect nature. The warning signals issued by specialists and community representatives, their explanations, and compiled statistics have an undeniable role, but effective ecological awareness and action can be achieved through sensitization and by engaging children's affective and volitional components (Dilă & Crăciun, 2002).

1.2. General aspects of environmental education – this topic was approached to make known the purpose of environmental education and its evolution. Thus, the purpose of environmental education (EE), besides promoting understanding of environmental issues and stimulating motivation to prevent and address them, is to ensure that preschoolers understand that humans are part of the biosphere and have the capacity to change the relationships between organisms (Stapp, 1969; Gülay & Öznacar, 2010). EE has gradually transitioned in recent decades to education for sustainable development (ESD), which emphasizes that anthropocentric values are less focused on the intrinsic value of nature and the moral

obligation to care for other species or ecosystems independently of "benefits for humans" (Kopnina, 2012; 2014).

Humans, through global climate change, pollution, habitat destruction, overexploitation, and the spread of invasive species, either directly alter the composition of biological communities or indirectly, by increasing the rate of species extinction (Hooper et al., 2005; IPBES, 2019). According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), up to 1 million plant and animal species may face extinction, many within decades, due to human activities, unless measures are taken to reduce the intensity of the determinants of biodiversity loss (IPBES, 2019).

These changes in local and global biodiversity are also a consequence of the current socio-economic model, based on the increase and global shift of traditional diets to diets richer in refined sugars, refined fats, oils, and meat (Tilman et al., 2014; Chaudhary & Kastner, 2016). Thus, human-induced biodiversity loss is not only unethical, as it disregards the intrinsic values of species and ecosystems, but also affects ecosystem services and multiple aspects of human well-being, particularly quality of life (Cafaro & Primack, 2014).

1.3. Environmental education at the preschool level – this topic was chosen because it is imperative to understand the importance of environmental education in the preschool context, as young children will inherit the planet, and according to data from the National Curriculum for Early Education (2019) in Romania, over 90% of children (aged three to six) are in kindergarten.

Environmental education, or environmental literacy, is an interdisciplinary field that aims to develop a sensitive and insightful understanding of the natural and artificial environment. In other words, environmental education provides how children and adults should learn and investigate the environment in which they live and make smart and informed decisions about how to protect the environment in which they live.

To provide these skills and competencies, it is important that the studies and implementation of necessary programs begin as early as possible, as shaping the skills and responsibilities required, values, and attitudes for environmental protection starts from an early age (Gülay & Öznacar, 2010; Nagra, 2010).

EE is a lifelong education, as scientific and social conditions related to environmental and sustainability issues are constantly changing. Environmental education requires constant critical thinking and decision-making, not only individually, but also as a society. Environmental education that is not systematically taught may fail to increase the number of

people who question, inquire, research, discover, are sensitive to the environment and environmental issues, who promote awareness, bring solutions to problems, and can implement these proposals. An environmental education program that does not adequately support all areas of development poses difficulties in acquiring environmentally responsible behavior and habits, negatively affecting the level of awareness of preschool children's perception of the environment. Therefore, it is crucial to plan and implement preschool education based on accelerating environmentally responsible skills and environmental education (Stapp, 1997; Culen, 2005; Damerell, 2007; Wells & Davey Zeece, 2007; Davis, 2009; Moseley et al., 2010; Broyles, 2011).

Nature has many benefits for physical and mental health. According to Driessnack (2009), direct exposure to nature is important for children's physical and emotional health, cognitive development, and resilience to stress and depression. All types of living and non-living environments include the concept of the environment (Doğan, 2017). The idea of the environment can be expressed through the ways living things interact throughout life and have social, physical, cultural, and economic relationships (Kuzu, 2007; Sungurtekin, 2001).

Environmental protection is the duty of all individuals, and overcoming environmental problems is possible through providing environmental education from an early age. Therefore, environmental education plays an important role in raising environmentally sensitive individuals (Akın, 2007; Erten, 2003; Marcinkowski, 2010; Morgil et al., 2005; Sungurtekin, 2001).

The approach to environmental education in kindergarten presents certain methodological particularities. At preschool age, environmental education focuses on the formation of skills and affective experiences.

The first contact with the environment and its problems must involve practical aspects at this age and provoke emotional experiences. Forming moral consciousness needs to be accompanied by the formation of moral conduct (Melis et al., 2020). It is considered that there is no universally valid recipe for triggering ecological behavior in each child.

To have an effect on children's development and in shaping their future personalities, environmental education activities are recommended to be carried out continuously, as much as possible to be part of the daily program, or at least some ideas to be infiltrated into various themes addressed in kindergarten. Thus, children's questioning about the ecological knowledge of relationships between living beings is fundamental for practices in early scientific education (Washinawatok et al., 2017).

1.4. Learning theories underpinning environmental education - this topic was addressed because it is essential for humanity to have deep knowledge, if possible from an early age (preschool level), about the interdependence and ecological role of organisms in order to effectively protect and conserve nature for future generations (UN General Assembly, 2015). The learning theories underpinning environmental education presented within this theme are:

1.4.1. Social Learning Theory - according to the social learning theory/vicarious learning proposed by Bandura (1965), most learning occurs through observing behaviors and consequences rather than exposure to punishments or rewards, and a child's social behavior is not innate but learned based on observing different models (Schunk, 2012). His research shows that the formation of new behaviors often occurs within interactions between the individual and the environment (Bandura, 1965, cited in Schunk & Pajares, 2002). In his view, Bandura (1965) states that social learning mainly occurs through the contribution of two processes, namely imitation and identification. Imitation is the process by which a specific action or set of actions is copied, allowing humans to acquire a series of skills very quickly and efficiently.

1.4.2. Socio-cultural Learning Theory - according to Lev Vygotsky's socio-cultural learning theory (1978, cited in Miller, 2011), the emphasis is on the active participation of children in the environment in which they live. Socio-cultural involvement defines and shapes children as well as their experiences, and children in this way leave their mark on culture. Children explore the opportunities offered by culture during active participation in culturally organized activities, such as games, conversations, stories, and family meals (Miller, 2011).

The role of the teacher and adults is to organize, support, and direct the child's learning. This guidance helps the child move through the zone of proximal development (ZPD), which is defined as the distance between the actual level of a child's development, determined by independent problem-solving, and the highest level of potential development determined by problem-solving under adult guidance or in collaboration with more advanced peers (Vygotsky, 1978; Cole, 1988).

1.4.3. Gibson's Ecological Theory - according to Gibson's Ecological Theory (1992), childhood is a period of perceptual discovery. Children look at and explore objects, events, and surfaces in the surrounding environment and thus learn what they can do in the world (Miller, 2011). Children are "information hunters and gatherers" who try to survive in a complex world of information.

1.4.4. Multiple Ecological Systems Theory - this theory states that human development is influenced by different types of environmental systems. According to this theory, children's behavior and way of being change depending on the environment in which they live (Bronfenbrenner & Evans, 2000; Guy-Evans, 2020). Bronfenbrenner (1979) postulated that the social world of the child can be conceptualized as a set of concentric circles with the child at the common point of the three intersecting circles: school, peers, and

1.4.5. Experiential Learning Theory Applied to Preschoolers - According to this model of experiential learning, learning occurs more optimally and efficiently if it is based on personal experience followed by reflection on that experience (Stan, 2016). An example of experiential learning is visiting the zoo where children learn about animals through direct contact and interaction with the environment rather than reading about animals (McCarthy & McCarthy, 2006).

The model of experiential learning is akin to a cyclical process due to the alternation between action and reflection, comprising four phases (Stan, 2016): concrete experience, which represents the learning situation where a person lives an experience; reflective observation, where the person makes observations about the experienced; abstract conceptualization, where the person formulates concepts, theories, generalizations based on observations and reflections; and active experimentation, where the person puts into practice the acquired knowledge.

1.4.5.1. Benefits of Experiential Learning in Nature for Preschoolers - This theme presents the benefits of experiential learning in nature on the development of attention, health, and learning in preschool children.

1.4.6. Forest Kindergarten Model - This theme was presented because the benefits of contact with nature have been documented in numerous studies conducted in recent decades (Menardo et al., 2021; Ohly et al., 2016; Wendelboe-Nelson et al., 2019), for recent reviews and meta-analyses.

Extended experiences in natural environments (Gascon et al., 2015), as well as short exposure to real and virtual nature (Kasap et al., 2021), improve psychophysical well-being and quality of life (Howell et al., 2011; Mayer & Frantz, 2004; Nisbet & Zelenski, 2013).

It is also recognized that exposure to nature leads to improvements in the health and well-being of children (Mason et al., 2022; Tillman et al., 2018; Vella-Brodrick & Gilowska, 2022). Children who experience nature for a long period can benefit from improvements in their well-being as well as social and academic performance, as well as physical and psychological competencies (Becker et al., 2017; Cooper, 2015; Dabaja, 2021; Harris, 2017).

Despite the known benefits of contact with nature and outdoor learning/play activities for children's health, there are concerns about the increasing trend of children spending less time outdoors in the natural environment. Several factors, such as lifestyle changes due to urbanization (Cox et al., 2018), as well as changes in social and educational practices, have led to a reduction in opportunities for interaction with nature (Hartig et al., 2014), even in childhood.

1.4.6.1. Self-Determination Theory - In the educational context, Self-Determination Theory (SDT) illustrates the conditions and processes through which growth is optimized (Ryan & Deci, 2017). These predominantly social conditions are studied in their role of facilitating or hindering human flourishing. By highlighting motivational processes, the theory manages to explore and explain personality growth, development, and how people relate to each other and to the environment.

1.4.7. The Concept of Moral Eco-Pedagogy in the Preschool Context - Moral eco-pedagogy can be described as education for sustainability aimed at raising awareness of the environment and shaping human consciousness regarding the surrounding environment (Simion, 2020).

Analyzing this study aimed at determining the attitude and behavior of preschoolers aged 3-6 years, as well as 7-year-old schoolchildren towards the environment within activities conducted by specialized teachers from the Green School, it can be concluded that experiential education conducted in nature has a positive impact on the free and harmonious development of the child, the development of a positive self-image, the development of the child's ability to relate to other children, to understand and manage their emotions, and to form environmentally sensitive children who are aware of the environment, investigate, seek solutions, and solve environmental problems (Simion, 2020).

1.5. Interdisciplinary Curriculum Development in Environmental Education for Preschoolers - According to Thiesen (2008), "the more interdisciplinary the teaching is, the greater the conceptual relationships between different sciences, the more problematization, stimulation, challenge, and dialectic teaching methods, the greater the possibility of understanding the subjects they learn."

Activities developed in the kindergarten context should allow children to become autonomous and independent in their thinking and procedural knowledge acquisition (know-how). Educators aim to promote children's autonomy and group autonomy. Acquiring know-how is necessary for their independence, and achieving greater autonomy is an opportunity

for choice and responsibility. One of the most well-known models of interdisciplinary curriculum development is that developed by Kirkpatrick (1994).

The author identified 10 generic points that should be considered in curriculum design. These 10 points indicate the importance of planning and that curriculum design goes beyond the content of the material taught.

1.6. Programs of Environmental Education in the Preschool Context at the International Level - This theme was addressed because it is a fact supported by data that environmental issues have increased in recent years and have become an important global issue. Especially from the second half of the 20th century, there has been sensitivity to environmental issues, and approaches to addressing these issues are gaining importance (Duran, 2021; Kışoğlu et al., 2010).

The preschool period plays an essential role in educating children about environmental awareness and in shaping and forming perceptions and attitudes towards the environment in preschoolers (Basile, 2000), and it is necessary to know the programs of environmental education in the preschool context at the international level. Since the child and the environment are an inseparable whole, it is extremely important for preschoolers to perceive the environment and related concepts correctly (Düzenli et al., 2019; Phenice & Griffore, 2003; Tilbury, 1994).

1.7. Programs of Environmental Education in the Preschool Context in Romania - The Concept of Green Week

The need for teaching environmental education in kindergartens is felt in our country as well. Thus, the Ministry of Education decided in 2023 to introduce a program called "Green Week." This program takes place over a period of 5 days during which only ecological activities are taught. The activities carried out within the "Green Week" program aim to create children who research, identify, make decisions, and find solutions to the environmental problems facing today's society (Government Decision no. 59/2023; Government Decision no. 877/2018).

The activities in this program are mandatory for both preschoolers and teaching staff and can be organized both within and outside the educational institution, with mandatory compliance with safety regulations for children. Through the activities included in the "Green Week" program, the aim is to raise awareness of the environment among preschoolers, as today's young children will become tomorrow's adults.

1.8. Attitudes and Conceptions of Educators Regarding the Need for Ecological Education in Kindergartens - In the field of ecological education, there has been a growing

concern among researchers in the last decade regarding the thinking of teachers about various concepts, theories, and methodologies of EE. This concern is not just a reflection of the general trend of constructivist research in education. It is also in line with the ideological and epistemological roots of EE that emphasize and encourage a fuller understanding, interpretation, and critical reflection on all environmental situations and complex and multifaceted educational situations (Flogaitis et al., 2006). Ecological education crystallized as a format in the middle of the last century, against the backdrop of a widespread concern that developed within the modern environmental movement.

While having the environmental discourse as a reference point, EE has evolved over 30 years of history, both as a theoretical flow, and as an educational practice, expressing the need to address three interconnected crises: (a) the environmental crisis, (b) the crisis in the relationship between humans and the environment, and (c) the crisis in education regarding traditional school practices (Flogaitis et al., 2006).

1.9. Tools for Assessing Children's Attitudes Toward the Environment - The literature provides a series of examples of scales for assessing children's attitudes toward the environment, such as the Children's Attitudes Toward the Environment Scale-Preschool Version (CATES-PV) and the Test of Environmental Awareness for Preschool Children (Musser & Malkus, 1994; Soydan & Samur, 2017). CATES-PV was derived from the Children's Attitudes Toward the Environment Scale (CATES), being a scale completed by the children's parents.

1.10. Objectives of the Doctoral Thesis

Over the course of the three years of doctoral studies, the following objectives are proposed:

STUDY I: Systematic analysis of the literature on ecological education in preschoolers.

STUDY II: Experimental study testing the methodological development of an educational program for developing ecological behavior in preschoolers.

STUDY III: Exploratory study of a method for investigating preschoolers' awareness of the ecological roles of organisms.

STUDY IV: Qualitative focus group study among preschool teachers regarding the need for and strategies of ecological education for preschoolers.

The **METHODOLOGY OF THE RESEARCH** part is structured into four research studies as follows:

STUDY I: Systematic Analysis of Literature on Ecological Education in Preschoolers

The aim of this study is to investigate, at the level of scientifically grounded specialized literature, the methods of providing early ecological education and how the effectiveness of ecological education in preschoolers is evaluated. The research questions addressed in this study are as follows:

- What are the operational definitions of ecological education/culture in kindergartens?
- What types of ecological education programs have been developed and investigated in the specialized literature, and what is their structure?
- What variables have been used to assess the impact of these programs on children, and what evaluation tools have been utilized?

To answer these research questions, relevant literature in the field of ecological education and culture was analyzed using the systematic analysis method. In this study, the Google Scholar search engine with the Advanced Search option was used, providing free access to a wide selection of scientific databases such as WOS, ScienceDirect, Springer Link, Wiley Blackwell, ProQuest Central, OVID LWW High Impact Collection, Oxford University Press, Taylor and Francis, EBSCO Academic Search Complete, and SCOPUS.

The following keywords were used for the search: "environmental education programs in preschoolers," "ecological culture in kindergartens," and "ecological attitudes and knowledge in preschoolers." The search included all articles from journals, books and e-books, conferences, dissertations, and specialized articles published in English between 2011-2022. Analyzing the specialized literature, 273 scientific papers were identified.

After eliminating studies that did not contain the keywords, 22 studies remained for analysis, of which 11 studies were eligible. Out of the 11 eligible studies, 3 were eliminated for not meeting the inclusion criteria, leaving a total of 8 papers included in the systematic literature analysis.

The selection and analysis process was based on a PRISMA-type diagram (http://www.prisma-statement.org/PRISMAStatement/FlowDiagram).

Systematic analysis of the specialized literature allowed for formulating answers to the following research questions:

1. What are the operational definitions of education/ecology in kindergartens?

The 8 articles studied were published in 5 journals between 2011-2021. The ecological education programs used varied in structure but aimed at developing behavior oriented toward an environmentally friendly approach and connecting children with nature from an early preschool age. All studies were conducted in Europe, namely 87.5% in Turkey and 12.5% in the Czech Republic.

According to the researched studies, ecological education in kindergartens is defined as the process of understanding the relationships between people and the environment. Ecological education in kindergartens was conducted in the studies included in the literature review with the aim of helping preschoolers become aware of plant and animal groups, as well as the long-term benefits these groups bring to preschoolers' lives. In other words, with the help of ecological education, certain concepts related to the environment and the relationships between the environment and people are clarified for preschoolers, thereby contributing to their ecological literacy development and a deeper connection with nature in terms of responsibility and sustainability.

2. What types of ecological education programs have been developed and investigated in the literature, and what is their structure?

Out of the 8 studies examined, 4 were qualitative studies, 2 were descriptive studies, one was experimental, and one was quasi-experimental. The qualitative studies (Gökçeli & Kandir, 2015; Kroufek, 2016; Kavaz et al., 2021; Karakaya et al., 2022) were conducted to investigate preschoolers' perception of the environment, to study whether there is a link between preschoolers' ecological attitudes and their parents' attitudes towards the environment. Additionally, in some of the studies, preschoolers were encouraged to discover new groups of organisms and their roles in the ecosystem, such as the Fungi group.

The studies indicated that preschoolers had perceptions of environmental protection in the "respect" and "reduction" dimensions, but they did not have perceptions regarding environmental protection in the dimensions of reuse, recycling, reflection, and redistribution.

The aim of the descriptive study (Tümer & Temel, 2021; Biber et al., 2022) was to examine the awareness and ecological attitudes of 5-6-year-old preschool children in nature-focused private kindergartens and public kindergartens and to measure the effectiveness of ecological education provided to preschoolers. It was found that there was a significant difference between the ecological attitudes and environmental awareness of preschoolers in private kindergartens and those in public kindergartens.

3. What variables are targeted by ecological education programs, and what tools have been used to evaluate program outcomes?

The variables used to evaluate the impact of the programs described in the researched studies on preschool children were: preschoolers' perceptions of the environment, preschoolers' environmental awareness, preschoolers' attitudes towards the environment, preschoolers' awareness of the existence of the Fungi group, and preschoolers' ecological attitudes.

The instruments used in the studies included in the systematic literature analysis are modern and innovative, as follows: Dey's method (1993), intentional sampling, the 7R model, preschoolers' drawings, personal information form, Environmental Awareness and Attitude Scale for Preschool Children, interview and ITEMAN statistical analysis program, semi-structured interview, Environmental Awareness Assessment Scale for Children aged 48-66 months, Teacher Interview Form, Teacher Observation Form, Family Interview Form, Family Participation Assessment, Statistica 12 software, specialized images, and Structured Interview Form.

The common point of the papers included in this systematic analysis study is the formation of favorable attitudes and environmentally friendly behaviors in children, as well as the formation of ecological awareness in preschoolers. In addition to activities aimed at developing ecological culture in children, some studies considered the importance of communication between parents and children.

Analyzing the studies, it was concluded that significant progress has been made in various aspects of children's development in terms of environmental awareness through programs, as well as in their socio-emotional and cognitive development.

The programs were associated with an increase in environmental-related concepts and words. In the selected studies, all ecological education programs were effective in achieving their intended goals. Therefore, according to this systematic review study, it is considered important to help children acquire ecological awareness from a young age and thus promote the formation of environmentally conscious adults.

In conclusion, through ecological education conducted in formal, informal, and non-formal contexts, it is possible to create significant connections between preschoolers and nature, thus preparing them to become responsible agents oriented towards sustainability in their communities and society.

STUDY II: Experimental Study Testing a Methodological Educational Program for Developing Ecological Conduct in Preschoolers

2.2.1. Introduction

The various social, cultural, and economic dynamics faced by today's society require education to become a set of renewed missions, which only through collective effort can address the constant socio-economic and environmental challenges (Carneiro, 1994). In other words, it is considered insufficient for an individual to only experience daily contexts for acquiring scientific knowledge about the environment and optimal interactions with it.

2.2.2. Objectives and Hypotheses

The study aims to include the acquisition of ecological knowledge in kindergarten activities to instill and cultivate friendly and responsible attitudes and behavior towards the environment in preschoolers.

The study aims to achieve the following objectives:

O1. Acquisition of ecological knowledge by preschoolers.

O2. Instilling and cultivating friendly attitudes and behavior towards the environment in preschoolers.

O3. Generalizing the acquired knowledge to the family level by investigating parental perceptions of the program's impact on children's ecological behaviors.

2.2.3. Methodology

In this research, the methodological testing approach through action research was chosen, according to the method described by Fereira et al. (2016). This methodology allows placing the researcher and the participants on the same action plan. Action research methodology is a practical and applied tool, governed by the need to solve real problems, with the objective of understanding, improving, and reforming practices (Coutinho et al., 2009).

Participants

The methodological testing study of including ecological education activities in kindergarten involved a total of 40 preschoolers, including 27 girls and 13 boys from a public kindergarten in Timiș County.

Children's participation was based on parental consent (informed consent) and the official agreement of the kindergarten's management.

The person implementing the program is the author of the doctoral study, who has expertise in ecological education (long-term studies in Environmental Science, as well as a doctoral degree obtained at the Banat University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timișoara, in 2020).

Procedure and Program Structure

The ecological education program was conducted in a public kindergarten in Timiș County from September 2021 to February 2022, based on approvals received from the Institution's management. The total duration of the program was 22 weeks.

The first two weeks of the study were dedicated to observing the group of children in the context of teaching and learning together with the group's teacher. Observing the children/group will allow us to obtain relevant information about each child and also about the entire group and understand how preschoolers react to teaching and learning contexts (curricular content, interaction: child, group of children, teacher - children). Observing each child and group, "means knowing their skills, interests, and difficulties, collecting information about the family context and the environment in which the children live, are necessary practices to better understand the characteristics of the children and adapt the educational process to their needs" (Ministry of Education, 2009).

Through dialogue, it will be decided together with the children that, in the following weeks, everyone will understand why it is important to protect and respect the environment, and it was agreed that we will find the answer to the question "Is our behavior friendly to the environment?"

The first experimental practical activity consisted of staging a recycling-themed play called **"Eco-Coloring."** To achieve performance, a didactic game was created in which the group room had different garbage scattered on the floor, half of the children wore colored recycling bins (green, blue, and yellow) made from reused materials, and the other half put the waste in the appropriate recycling bin. All the children repeated the game. To complicate the game, the teacher challenged the group of children with incorrect behavior (for example, using the recycling bins incorrectly). The children showed that they are always attentive and taught the adults to behave in a friendly manner towards the environment. In the end, the children sang the song: "I have a plastic bottle."

The second experimental practical activity was the construction of a train from recyclable materials.

Using recyclable materials, the children built trains that they then painted with great enthusiasm, understanding the importance of reusing waste; promoting waste reuse; stimulating creativity; developing fine motor skills.

The third experimental practical activity was the children's participation in an integrated didactic activity in the experiential domains of Language and Communication, conducted through reading from pictures promoting ecological awareness, and in Human and Society, where small digesters were built from plastic bottles.

The fourth experimental practical activity consisted of the children completing six challenges:

- The children placed organic waste (fruit peels, bread, oils), plastic, paper, polystyrene in plastic bottles (called digesters).
- The children were asked if the digester is identical to the soil with garbage in the garden. Through guided dialogue, we concluded that it can be similar to soil. Then we mixed soil from the garden with garbage/waste.
- The children were asked if water is important for the soil in the garden?
- The children were challenged to put water only in one digester. Will something different happen in the digester that has water compared to the one that does not?
- When the digesters were closed, the issue of the existence of air as it exists in the garden was raised. The children were asked if it is the same as in nature.
- The children were asked if the digesters should be in the sun?

The fifth practical activity - For 15 days, over 30-40 minutes daily, the children observed the evolution of household waste stored in digesters.

The sixth practical activity - together with the children, a brief recapitulation of the activities performed was conducted.

2.2.4. Results

The results obtained in this methodological testing study were based on collecting the following data:

(a) Children's perceptions (reflections) collected through interviews at the end of the program.

(b) Parental perceptions collected through semi-structured interviews after the program ended.

(c) Qualitative evaluation by participating educators of the teaching method and learning resources.

The entire group of children actively and enthusiastically participated in the activities of this study. During the study and at the end of it, we were able to observe what the children learned.

The perceptions (reflections) of the children collected through interviews at the end of the program.

The children's reflections on the activities conducted are presented below:

(I) First practical-experimental activity - Theater: "Eco-coloring"

"I learned to dispose of waste properly and will teach my younger brother which bin to throw the waste into. Also, I will tell my friends that not all waste is the same for the environment and only some waste is biodegradable."

"I will tell my family why recycling bins are important for the environment."

(II) Second practical-experimental activity: Building toys from reusable materials.

"I learned that I can reuse household waste and build toys from them."

(III) Third practical-experimental activity: What happens to the waste we throw into the ground?

"I noticed that some waste does not decompose. I learned that some waste decomposes more slowly than others."

"I learned that I need to keep the environment clean and respect it to breathe clean air."

"I learned new words: decomposition, digester, conservation, biodegradable, and environmental/nature sustainability."

"When are we doing another experiment as interesting as this one?"

The perceptions of the parents of the children participating in the ecological education program.

The collection of parental perceptions was done by elaborating a form in Google Forms format and sending the form to the parents of the preschoolers included in the study. The text included below contains the informed consent of participation as respondents. The data collection questions were open-ended. These are presented below:

- Have you noticed in the six months following the completion of the ecological program at kindergarten if your child uses nature- and recycling-related words more frequently? Please describe briefly.
- Have you noticed in the six months following the completion of the ecological program at kindergarten any changes in your child's behavior (more attention to recycling, making toys from recyclable materials, etc.)? Please describe briefly.
- Have you noticed in the six months following the completion of the ecological program at kindergarten if your child has shared with siblings/cousins/playmates the ecological activities conducted at kindergarten? Please describe briefly.
- What ecological education activities do you think need to be done at the kindergarten where your child attends?
- How do you think you could get involved as parents in the educational activities at kindergarten to promote respect for the environment and nature in your children?

The form was completed by 17 parents (16 mothers and one father, aged between 30-40 years old), but 15 parents answered all the questions in the form structure, and the responses recorded using the online form were transcribed verbatim by the doctoral thesis author.

The obtained information was analyzed according to the thematic qualitative content analysis method described by Erlingsson & Brysiewicz (2017), following these three steps: transcription of the text, condensing the text by identifying units of meaning (codes), identifying themes and categories.

Qualitative evaluation of the teaching and learning method and teaching resources

In the first two weeks of the study, the initial assessment of the preschoolers' knowledge about ecological education was conducted, and the behavior of each child was observed. All information was noted in the observation notebook, with each preschooler having an individual observation sheet.

Throughout the study, formative assessment of preschoolers was conducted, which involved continuous observation of children's behavior, capturing their reactions to study demands, noting preschoolers' progress, identifying difficulties they encountered in completing various study tasks, and providing support and guidance to preschoolers in learning tasks.

At the end of the study, summative evaluation was conducted to review the skills, knowledge, abilities, and attitudes acquired in the learning activities from the study, with the aim of reinforcing the newly acquired behaviors.

In terms of the teaching-learning process, direct observation, and experimentation, the following were noted:

(i) The entire group of preschoolers actively and creatively participated in activities and performed the prescribed activities regarding ecological behaviors.

(ii) Knowledge from one experiential domain was harmoniously combined with knowledge from other experiential domains.

(iii) Activities took place in a relaxed and enjoyable environment, in the form of games and guided reflections in a friendly manner.

2.2.5. Discussions and Conclusions

Based on direct observation during practical-experimental activities, designed within the framework of an interdisciplinary perspective (integrating the native language and art), where children learn from everyday situations and in a relaxed and fun learning environment, the following aspects regarding the education methodology were observed:

The entire group was able to observe and carry out activities, as well as describe, interpret, and apply information provided about environmentally friendly behaviors.

This pedagogical and didactic experiment had a globalizing character and allowed children to engage in specific procedures and ways of thinking inherent to the construction of scientific knowledge.

In the dramatization through song, the connection between musical expression, dramatic expression, and oral communication development was promoted, which proved to be a context that stimulated involvement and curiosity. It also provoked concern and joy, thus sensitizing to the importance of solving environmental problems through behavior.

Theater and toy building stimulated autonomy, responsibility, teamwork, involvement, initiative, curiosity, concern, joy, and children's oral communication skills. It also sensitized to the importance of solving environmental problems through environmentally friendly behaviors.

The methodological test study of implementing an ecological education program in kindergarten was perceived as interesting and motivating for children, achieving the main objective of building the foundations of environmentally friendly behavior in preschoolers, as well as secondary objectives.

The understanding of children regarding environmentally friendly attitudes and behaviors was remarkable. It was concluded that activities should be conducted in a way that allows children to observe, ask questions, experiment, verify, and decide.

The recreational and didactic orientation of the activities also developed their oral language, helping them to view waste in a new way, as well as encouraging curiosity and reasoning development. Recreation is eminently educational in the sense that it is the force that stimulates our curiosity about life and the world; it is the beginning of all discoveries and creations.

The children's question at the end of the study was, "When are we doing another experiment as interesting?" This is evidence based on children's reflections that we need to continue these experiments to instill environmentally friendly behavior in preschoolers and teach them to respect the environment in which they live.

STUDY III: Exploratory Study of a Method for Investigating Preschoolers' Awareness of Ecological Roles of Organisms

The aim of study three was to develop the level of awareness of ecological behavior and the ecological roles of organisms in preschoolers.

Research Objectives

- Designing a system of experiential learning activities based on playful teaching.
- Increasing preschoolers' awareness of the importance of ecological behavior.

Research Questions

The study aims to answer the following research questions:

1. How do preschoolers classify the (relative) importance of living organisms?
2. Do preschool children recognize living organisms and their interdependence?

2.3.3. Materials and Methods

Participants:

During the academic year 2021-2022, preschoolers from two kindergartens in Timiș County, one public and one private, participated in the study.

The public kindergarten had 61 preschoolers (average age of 5 years), and the private kindergarten had 20 preschoolers of the same age group.

Participation was based on parental consent (informed consent) and the official agreement of the management of the two kindergartens. In terms of gender distribution, the program included 25 boys and 36 girls from the public kindergarten, and 11 girls and 9 boys from the private kindergarten.

Instruments and Procedure:

Data on recognition and classification of presented organisms were collected from children through a semi-structured interview based on questions and using images showing six different organisms expected to be known to preschoolers.

Each interview lasted between 5-10 minutes and was conducted individually in Romanian, the children's native language, with the permission of parents and children.

Children were shown six images representing different living organisms and were asked to identify and classify them. The organisms included a bumblebee, trees, an edible mushroom, a squirrel, an earthworm, and a wolf.

2.3.4. Results

***Results from the Public Kindergarten*:**

Almost all children recognized and classified all species of organisms viewed except for the bumblebee, which was classified as a bee.

The most important organism was considered to be the squirrel, followed by the wolf, trees, mushrooms, earthworms, and bees. About a third of preschoolers identified the squirrel as the most important organism among the six species presented. All children correctly identified the earthworms and mentioned their role in soil cleaning. Regarding mushrooms, children said they are essential because they provide food and help us grow stronger. All children correctly identified trees and said they help us breathe. Regarding the wolf, all children said it is the most important because it is the strongest.

Results from the Private Kindergarten:

All organisms were recognized at the private kindergarten, except for the bumblebee, which was classified as a bee.

Children in the private kindergarten considered trees to be the most important organisms, followed by the wolf, mushroom, squirrel, bumblebee (identified as a bee), and earthworm. Statistical analysis showed no significant difference in the recognition of organisms between the two kindergartens.

In conclusion, both public and private kindergarten children demonstrated a good understanding of the importance of different organisms and their ecological roles, with slight variations between the two groups.

2.3.5. Discussions and Conclusions

In this study, almost all participating children recognized and classified all organisms in the image based on their importance for nature. This indicates that, although they are at a young age, preschoolers appreciate the complexity of relationships between organisms in nature.

What is important to emphasize is that, although they are very young and we would expect them to classify organisms based on their "cuteness" factor, children classified organisms based on their importance for nature, except for the squirrel. Although the squirrel ranked first, preschoolers did not provide explanations about its ecological role, highlighting instead its "cuteness" factor. However, they mentioned that squirrels "gather nuts," an explanation that may come from various children's songs and cartoons where squirrels are depicted in this way.

The data obtained in this study are similar to those from a Norwegian study on children's preferences, where the squirrel ranked third in importance, after the dog and the cat. Similarly, in our study, the squirrel was ranked as the most important, considering its popularity and "cuteness" effect. These data suggest that the ecological role of squirrels is not as evident for children as their aesthetic value.

Mushrooms were recognized as the most important organisms in nature by a small percentage of interviewed preschoolers. Preschoolers attributed nutritional value to mushrooms from a human perspective and did not recognize their ecological role.

This phenomenon of "plant blindness," i.e., the lack of attention to plants despite their crucial role in ecosystems, has been studied in many specialized works. This lack of interest is often attributed to the immobility of plants and is reinforced by teachers' tendency to focus more on animals than on plants.

In our study, interviewed preschoolers addressed explanations regarding the relationships within the ecosystem, such as: squirrels eat nuts and warn other animals of danger, and the wolf is considered the most important because it is the strongest.

Another important aspect is that none of the preschoolers considered the six organisms as associated with negative aspects in nature. The fact that preschoolers did not recognize the beetle and confused it with the bee raises the question of whether the

environmental education program should focus more on teaching children to recognize these organisms and to understand their roles in nature.

Earthworms were ranked as the most important for nature by a small percentage of preschoolers, and children's explanations about earthworms were ecological in nature. These data are similar to those obtained in a study conducted in Italy, where children addressed the effect of earthworms on soil quality.

Trees were recognized and evaluated as the most important organisms in nature by a small percentage of preschoolers. They were recognized for their ecological role in producing oxygen and providing cleaner air to humans.

Analyzing the data from the public and private kindergarten, it was observed that children from the public kindergarten consider the squirrel to be the most important animal for nature, while in the private kindergarten, children consider trees to be the most important organism for nature. Interpreting these results requires additional data on children's exposure to nature and the information provided by teachers or parents before the start of our experiment.

In the future, it is proposed to conduct research aimed at the systematic and complementary use of environmental education activities for preschoolers, to investigate whether this leads to an improvement in the level of awareness of ecological behavior and the development of specific teamwork skills for carrying out nature conservation activities.

2.4. STUDY IV: Qualitative Focus Group Study on Environmental Education for Preschoolers

2.4.1. Introduction

The primary purpose of environmental education is to shape attitudes and behaviors that lead to environmental protection. Starting from this premise, it is considered appropriate for environmental education to be provided as early as possible, i.e., from preschool age, as this is when the cognitive, emotional, and moral formation of future responsible individuals begins (Ferreira et al., 2016).

Preschool educators have the responsibility to design, organize, and implement ecological activities in ways that arouse children's enthusiasm and desire to engage in current environmental issues, as well as to try to find sustainable solutions to conserve the environment (Wilson, 2002).

This study aims to investigate the perceptions of preschool teachers regarding the need for environmental education for preschoolers and the cultivation of environmentally friendly behavior from an early age.

The objectives of this study are:

To investigate the knowledge and attitudes regarding environmental education for preschoolers among preschool teachers.

To identify the methods used by preschool teachers to implement environmental education activities in kindergarten.

To identify the needs of participating teachers regarding the development of environmental conduct in preschoolers through environmental education activities.

2.4.2. Methodology

Participants

Invitations to participate in the study were sent to 7 preschool teachers from a public kindergarten in Timiș County for the school year 2022-2023. All 7 teachers confirmed their participation, but due to personal reasons, only 5 out of the 7 teachers participated effectively

The teachers provided informed consent and were informed about the data recording and confidentiality of the provided data.

Procedure

According to Krueger and Casey (2014), the focus group method involves a carefully constructed discussion aimed at understanding participants' perceptions on a chosen topic and generating hypotheses. The optimal time for conducting a focus group is estimated to be between 90-150 minutes (Shamdasani, 2015).

The discussion was facilitated by a moderator, in this case, the author of the study. The online platform Google Meet was chosen as the meeting place for conducting the focus group. A pleasant environment conducive to discussion was created, without actions that would constrain the teachers in any way. There were no restrictions or right or wrong answers; the teachers were informed about these aspects so that they could express their opinions honestly.

The duration of the focus group was 60 minutes, with each teacher allocated 3-5 minutes for each response to the questions.

The responses recorded during the focus group were transcribed verbatim by the author of the study. The data obtained will be analyzed according to the method described by

Erlingsson & Brysiewicz (2017), following three steps: transcription of the text, condensation of the text by identifying units of meaning (codes), identification of themes, and categories.

Questions asked during the focus group:

Have you implemented environmental education activities in your group? Please describe them.

How did you feel when implementing environmental education activities in your group?

How do you think preschoolers perceived these environmental education activities?

What do you think is necessary for environmental activities to be an appropriate pedagogical and didactic resource to instill environmental behavior in preschoolers?

What skills do you think preschoolers develop as a result of participating in environmental education activities in kindergarten?

In what ways do you think parents and/or preschoolers' caregivers could contribute to environmental education activities in kindergarten?

Would you like to participate in environmental education activities implementation training in the future? How do you think these should be conducted?

2.4.3. Results

The information obtained was analyzed using the thematic qualitative content analysis method described by Erlingsson & Brysiewicz (2017), involving three steps: transcription of the text, condensation of the text by identifying units of meaning (codes), and identification of themes and categories.

2.4.4. Discussions and Conclusions

After analyzing the data obtained from the discussion group, we observed that preschool teachers express a continuous desire for training regarding the implementation of environmental activities and hold a positive attitude towards environmental education activities.

The perception of preschool teachers regarding environmental activities is positive, enthusiastic, and devoted. The environmental activities described by the participants were conducted using various pedagogical techniques to engage children with the environment and foster their care for the environment. As a result of the environmental activities carried out by the teaching staff involved in the study, preschoolers developed numerous positive skills and competencies related to the environment and everyday life.

Through the pedagogical techniques employed, the teaching staff managed to establish collaboration with the parents of preschoolers, enabling them to receive support in conducting environmental activities, while parents ensured the continuity of environmental learning at home.

According to this study, participating teachers demonstrate curiosity and a clear desire to explore the environment, and through their attitude towards the environment, they transmit to children the desire to explore and understand the environment in which they live. Teachers consider the environment a healthy environment for the complete and harmonious emotional development of children. Additionally, teachers mention the positive impact of nature on children in terms of physical and mental health, as well as compassion, self-confidence, and overall well-being.

Analyzing the results of this study, we can conclude that the focus group method can be suitable for analyzing the readiness of teachers to be trained in implementing environmental education, with the aim of creating preschoolers capable of reflecting, thinking critically, seeking, and implementing solutions to give the environment its rightful place in humanity's daily life. The themes and categories identified in this study will allow for the design and subsequent implementation of kindergarten teacher training programs in promoting environmental education for preschoolers, encouraging teachers to implement environmental education activities in their classrooms, with the ultimate goal of instilling an environmentally friendly mindset and behavior among preschoolers.

CHAPTER III. DISCUSSION, CONCLUSIONS AND LIMITATIONS

3.1 Introductory Considerations

This main objective of this doctoral research was to investigate and develop aspect if the ecological behavior among preschoolers. First, through the studies conducted within this doctoral thesis, behavioral models regarding the environment and its relationship with the surroundings were provided to preschoolers by the teaching staff involved in the study. This is because the preschool period is the optimal time to start ecological education for preschoolers, aiming to develop individuals sensitive to the environment and the associated ecosystem issues.

Second, two ecological education programs for preschoolers were implemented within this thesis, aiming to raise awareness among preschoolers about environmental issues and to foster individuals who investigate the causes of these environmental problems, find solutions, and apply them sustainably and with respect.

Third, a qualitative focus group program was conducted to investigate the perceptions of preschool teachers from a kindergarten in Romania regarding environmental education and the cultivation of environmentally friendly attitudes and behaviors among preschoolers.

The theoretical part of this doctoral thesis highlights that according to learning theories such as social learning theory, sociocultural learning theory, ecological theory, multiple ecological systems theory, experiential learning theory, and self-determination theory, it is essential for humanity to have a deep understanding, if possible from an early age (preschool level), of the interdependence and ecological role of organisms. This is necessary to efficiently protect and conserve nature for future generations by raising awareness of the roles played by social and cultural factors in teaching ecological education.

Cognitive and contextual theories emphasize that preschoolers are active constructors of knowledge and that development is a continuous process throughout life. Contextual theories underline the modified nature of social patterns and how they lead to different interactions between children, peers, and adults. Cognitive development largely emerges as a consequence of these interactions, and children's behaviors in turn modify environments. Thus, children can develop new interests that bring about changes in their social networks, such as the groups of peers they socialize with.

Another important aspect of the theoretical foundation of this thesis is the study of various ecological programs addressed to preschoolers in an international context. The areas of interest in these studies include preschoolers' perception of the environment, preschoolers' environmental awareness, preschoolers' attitudes toward the environment, preschoolers' awareness of the existence of the Fungi group, and the ecological attitudes of preschoolers and their parents.

The common goal of these studies has been to develop environmentally friendly behavior starting from preschool and to connect children with nature from an early age. According to these ecological programs in an international context, good ecological education during the preschool period should include content related to real-life experiences, interactions with various disciplines, and communication with children. Teachers should focus more on experience than on teaching, demonstrate their interest in the environment to children, and serve as role models in environmental protection.

According to these studies, ecological education should start with simple experiences, and children should have positive experiences in open spaces. It should be implemented from the preschool age to successfully shape behaviors and attitudes toward nature in children,

which should be internalized and become natural in subsequent stages of individual development.

Another important detail within this research thesis was the study of ecological programs in kindergartens in Romania and the necessity for the Ministry of Education to introduce the Green Week program, as well as the study of concepts such as Moral Eco-Pedagogy and Forest Kindergarten.

3.2 Theoretical Contributions

The main contribution of this doctoral research thesis in the field of education sciences is the understanding of how ecological behavior can be formed in preschoolers, a behavior that must be accompanied by the development of moral consciousness in preschoolers.

In the pedagogical process of teaching ecological education, it is considered imperative to trigger curiosity and the desire to learn more about environmental issues in preschoolers, as they develop their own responses to environmental problems. Ecological education, if not taught systematically, may fail to increase the number of individuals sensitive to the environment and environmental issues, who promote awareness, bring solutions to problems, and implement these proposals. An ecological education program that does not balance all areas of development may cause difficulties in acquiring environmental responsibility behaviors and habits, thereby negatively affecting the level of awareness of preschool children's perception of the environment.

Another significant contribution is understanding how educators perceive ecological education and their willingness to learn what is not clear to them about teaching ecological education to shape preschoolers with moral consciousness toward the environment. Thus, it is essential to plan and implement preschool education based on accelerating environmentally responsible skills.

By understanding the concept of moral eco-pedagogy, defined as education for sustainability aimed at raising awareness and shaping human consciousness regarding the environment, this research work makes a significant contribution to education sciences. Spending time in nature, children relate better and more easily with others, they are happier, perceive certain aspects related to their own emotional experiences and those of other participating children in activities, and easily become aware of the problems the environment faces.

By including the concept of Forest Kindergarten in the theoretical foundation of the thesis, a valuable contribution is made to the field of education sciences because it contributes to raising awareness of the beneficial effects of prolonged exposure of children to nature. Children who experience nature for an extended period can benefit from improvements in their overall health and well-being. They may experience improvements in their subjective happiness, as well as in social and academic performance, as well as in physical and psychological skills.

3.3 Methodological Contributions

The basic condition of this doctoral research work is understanding the methodology of teaching and applying ecological education to preschoolers.

An important methodological contribution is the description and summary in Romanian of the content and results of ecological education programs for preschoolers conducted in an international context. These programs targeted preschoolers' perception of the environment, preschoolers' environmental awareness, preschoolers' attitudes toward the environment, preschoolers' awareness of the existence of the Fungi group, and the ecological attitudes of preschoolers and their parents.

These studies have demonstrated that the preschool period is the optimal starting point for teaching ecological education to lay the foundation for appropriate behavior in relation to the environment and to develop individuals sensitive to the environment and the issues associated with interactions with the environment.

We consider it essential for our country to take a step forward regarding ecological education for preschoolers. These ecological programs conducted with preschoolers can serve as important starting points for ecological education taught in the preschool context in our country. In this direction, the Ministry of Education has introduced the Green Week ecological program from the 2022-2023 school year, precisely out of the necessity of teaching ecological education from the preschool period.

Another methodological contribution of this work lies in structuring research plans around qualitative, exploratory, and experimental methods.

In the experimental study, the action research method was employed, placing the researcher and participants on the same action plan. This approach involves awareness from each actor (individual and group), leading to knowledge construction through comparing and contrasting the meanings produced by reflection. The ultimate goal is the development of ecological consciousness and nature conservation, as well as the development of specific

competencies for independently carrying out nature protection activities (Mesquita-Pires, 2010).

Exploratory study methods have led to the investigation of preschoolers' perception of the importance of six organisms to nature (i.e., how the roles of organisms are perceived, understood, or interpreted). These organisms were selected as part of the local fauna, representing different trophic levels of the food web (producers, second and third-order consumers, decomposers), with the ultimate goal of developing preschoolers' awareness of the ecological roles of organisms.

Qualitative methods (focus groups, content thematic analysis) have led to the study of parents' and teachers' perceptions in preschool education regarding the need for ecological education for preschoolers. The final objective of this study is to cultivate in preschoolers a friendly behavior towards the environment from early childhood.

3.4 Practical and Empirical Contributions

This research provides numerous practical and empirical contributions to the field of education.

Development of Behavioral Models for Preschoolers: One significant contribution is the elaboration of behavioral models for preschoolers, which can be adapted based on their age and developmental level. Education researchers recommend initiating ecological education during the preschool period, as it is when the precursors of children's behaviors begin to form. Evidence suggests that during this preschool age, children learn significantly from the personal example set by educators and adopt the educators' attitudes towards the environment.

Accessing International Environmental Education Programs: Another practical and empirical contribution is the access to international environmental education programs. These programs can be successfully implemented in Romanian kindergartens. Based on the evidence summarized in the research, future studies can explore various aspects such as preschoolers' perception of the environment, their awareness of environmental issues, their attitudes towards the environment, awareness of preschoolers about the existence of the Fungi group, ecological attitudes of preschoolers and their parents, and other areas related to environmental education.

Application of Forest Kindergarten Principles: Thanks to the contributions of this doctoral thesis, the principles of Forest Kindergarten can be studied and applied in Romania. This concept, successfully implemented in various countries such as Scandinavia, Denmark,

Portugal, South Africa, Brazil, Slovenia, India, Italy, and the USA, emphasizes the importance of the "place" for learning. It encourages children's curiosity and their intrinsic tendencies to learn and explore the world around them in a natural environment.

Promotion of Eco-Pedagogy: A final practical contribution of this research is the promotion of the concept of eco-pedagogy. Through the conducted activities, children can grasp the significance of eco-pedagogy. By engaging in ecological activities tailored to their age and developmental level, preschoolers can become more aware of the environment and develop moral consciousness and behavior towards their surroundings.

3.5. Research Limitations

Upon examining each study within this doctoral research work, several limitations can be noted:

Systematic Literature Review Study: The systematic analysis of specialized literature on environmental education (EE) for preschoolers encountered a limitation due to the relatively small number of studies in the field of EE for preschoolers. Initially, 273 specialized works were identified through systematic analysis. After excluding studies that did not contain the keywords, 22 studies remained for analysis, out of which only 11 were eligible. Further, 3 out of the 11 eligible studies were eliminated, leaving a total of 8 works included in the systematic literature analysis. This limited pool of literature may constrain the comprehensiveness and depth of the review.

Evaluation of an Educational Program Study: The study aimed at testing an educational program's impact on the development of ecological behavior and awareness of ecological roles of organisms among preschoolers faced a limitation due to the relatively small number of participating parents. Despite sending the questionnaire to 40 parents, only 15 parents responded to all the questions in the questionnaire. This limited response rate may affect the generalizability and reliability of the findings, as well as the statistical power of the analysis. Further efforts to increase participation could enhance the robustness of the study results.

These limitations should be taken into account when interpreting the findings of the respective studies and considering future research directions in the field of environmental education for preschoolers. Addressing these limitations in future research endeavors can contribute to a more comprehensive understanding of the subject matter and facilitate the development of more effective educational interventions.

3.6. Future Research Directions

This doctoral research work proposes the following possible directions for future research:

Systematic and Complementary Use of Environmental Education Activities: Conduct research aimed at systematically and complementarily utilizing environmental education activities for preschoolers to investigate whether this approach leads to the development of specific teamwork competencies for engaging in nature conservation activities.

Design and Implementation of Kindergarten Educator Training Programs: Design and subsequently implement training programs for kindergarten educators focused on promoting environmental education for preschoolers. Encourage educators to incorporate environmental education activities into their classrooms, with the ultimate goal of instilling an ecological mindset and fostering environmentally friendly behavior among preschoolers.

Exploration of Parental Involvement in Environmental Education Implementation: Investigate aspects related to the implementation of environmental education involving parental engagement in activities conducted within preschool groups. Understanding the role of parents in environmental education initiatives can provide valuable insights into enhancing the effectiveness and sustainability of such programs.

Development of Emotional and Cognitive Impactful Environmental Activity Modules: To develop modules of environmental activities with significant emotional and cognitive impact on preschoolers. These modules should align with the objectives promoted by environmental education and contribute to shaping preschoolers who are attentive to environmental issues, actively seek and successfully apply solutions to address them, operating under the premise that today's preschooler is tomorrow's adult.

By pursuing these future research directions, advancements can be made in understanding and promoting environmental education among preschoolers, ultimately contributing to the development of environmentally conscious individuals and sustainable communities.

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