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METHODS FOR DEVELOPING NATURAL SCIENCE AND ENVIRONMENTAL COMPETENCE IN OLDER PRESCHOOL CHILDREN WITHIN THE CONTEXT OF SUSTAINABLE DEVELOPMENT EDUCATION

Abstract.

This article analyzes the issue of developing natural science and environmental competence in older preschool-aged children within the framework of sustainable development education. Nature conservation is identified as one of the priority areas in the development of sustainable development skills. An analysis is conducted of studies by Ukrainian and foreign researchers on the characteristics of developing natural and environmental competence in preschool-aged children within the framework of sustainable development education. The issue of developing sustainable development skills has been studied by researchers such as J. Davis, I.Pramling Samuelsson, J. Siraj-Bletchford, I. Engdahl, A. Anishchuk, L. Bobro, N.Gavrysh, N. Myskova, O. Malanchuk, O. Maksimova, O. Pometun, and others. Effective means, methods, techniques, and forms of work have been identified for fostering natural and environmental competence in older preschool-aged children within the context of education for sustainable development (games, project-based activities, environmental training sessions, simple experiments, outdoor activities, and reading and discussing children's literature and environmental fairy tales). The article presents a study on the effectiveness of teaching methods and approaches for preschool-aged children, identifies modern methods, approaches, and techniques for developing natural and

environmental competence in older preschool-aged children, and justifies the need to organize a natural and environmental learning environment for acquiring skills in sustainable development education.

Among the effective methods for working with children are: thought-provoking questions, explanations, play-based activities, adult guidance, and support. The main forms of work with children include: experiments, environmental projects, games, field trips, purposeful walks, environmental training sessions, eco-campaigns, festivals and exhibitions, and organizing outdoor activities. The distinctive features of environmental education for older preschoolers include: the development of children's cognitive activity, the development of their sensory faculties and perceptual abilities, and the acquisition of sufficient experience and knowledge for further practice in hands-on activities.

Keywords: preschool education, sustainable development, older preschoolers, methods, forms, techniques.

Statement of the Problem.

The current environmental state of the planet is characterized by a complex of environmental problems: climate change, air pollution, the depletion of water and soil resources, the loss of biodiversity, the degradation of natural ecosystems, the depletion of natural resources, and the increase in waste. These processes pose a threat to human health and quality of life, as well as to the economic stability of society, and they degrade the planet's ecological environment. A number of environmental problems have also been identified in Ukraine, including air and drinking water pollution, declining soil fertility, the accumulation of industrial and household waste, a reduction in land area, and the loss of biodiversity.

The environmental situation in Ukraine has worsened due to the imposition of martial law in the country and has led to widespread environmental consequences. Military operations lead to the destruction of natural ecosystems, forest and steppe

fires, soil and water contamination, damage to industrial and energy facilities, and the generation of waste from the destruction of buildings, all of which contribute to the deterioration of the condition of flora and fauna throughout Ukraine. The consequences of the war's impact will be felt throughout the country's long-term recovery period and will require comprehensive measures to rebuild wastewater treatment facilities and restore natural ecosystems and water resources.

In the context of the current environmental crisis, it is particularly important to foster an environmentally conscious individual who is capable of restoring the country's ecological condition and recognizing the consequences of their actions. Thus, environmental education should begin in early childhood, focusing on fostering a value-based attitude toward nature, nature conservation skills, and sustainable environmental habits.

It is precisely during the preschool years that the foundations of a value-based attitude toward nature are laid, cognitive activity develops, and initial experiences of interacting with nature are formed. Consequently, there is a need to foster environmental competence within the framework of education for sustainable development, beginning in the preschool years.

The relevance of this research topic stems from the need to improve the content and methods of environmental education for older preschoolers, particularly through the organization of systematic nature observations as an effective means of learning about the surrounding world. These observations foster the development of curiosity, ecological thinking, and the ability to identify cause-and-effect relationships in nature, as well as the formation of a caring attitude toward natural objects.

Analysis of Recent Studies and Publications.

The current stage of societal development is characterized by worsening environmental problems, which necessitates the cultivation of environmentally conscious individuals starting from preschool age. The regulatory, legal, and conceptual framework for this study is based on international documents from the UN

and UNESCO in the field of sustainable development and education for sustainable development, including the UN 2030 Agenda for Sustainable Development, the Sustainable Development Goals (SDGs), the UN Convention on the Rights of the Child, and the UNESCO program «Education for Sustainable Development: Roadmap» In Ukraine, the regulatory framework for education for sustainable development consists of Presidential Decree No. 722/2019 «On Ukraine's Sustainable Development Goals for the Period up to 2030», the Ukrainian laws «On Education», «On Preschool Education» and «On Environmental Protection» as well as the Core Component of Preschool Education.

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Studies by foreign and Ukrainian scholars emphasize the need to develop natural and environmental literacy in older preschool-aged children within the framework of education for sustainable development. Foreign researchers J. Davis, I. Pramling Samuelsson, J. Siraj-Bletchford, I. Engdahl, and others believe that fostering sustainable development skills in early childhood and preschool-aged children should

be carried out through inquiry-based and practice-oriented activities, motivating children to engage in independent exploration of nature. Ukrainian researchers A. Anishchuk, L. Bobro, N. Gavrysh, N. Myskova, O. Malanchuk, O. Maksimova, O. Pometun, and others have examined issues such as the training of future educators to foster skills in children oriented toward sustainable development, the development of natural and environmental competence in preschool-aged children, and an individualized approach to environmental education for children. The effectiveness of using forms, methods, and techniques for developing natural and environmental competence in preschool-aged children has been demonstrated in studies by researchers V. Butenko, N. Vlasenko, and V. Partolu. However, the insufficient development and systematization of methods for fostering natural and environmental competence in older preschool-aged children within the context of sustainable development education led to the selection of the topic of our study.

Purpose of the article.

To conduct a theoretical analysis of the issue of developing environmental and ecological competence in older preschoolers within the context of education for sustainable development, and to justify effective forms, methods, and techniques for developing sustainable development skills in older preschoolers.

Presentation of the Main Research Material.

In the context of the current environmental crisis, the development of an environmentally conscious individual – one capable of restoring the country's ecological condition and recognizing the consequences of their actions – has become particularly relevant. Thus, environmental education should begin in preschool, with a focus on fostering a value-based attitude toward nature, nature conservation skills, and sustainable environmental habits.

The international community's response to the escalating environmental challenges was the establishment of the United Nations Sustainable Development Goals (SDGs), the achievement of which requires the active participation of the

education system. Of particular importance in this context is the goal defined as «Quality Education», which focuses on the acquisition of knowledge and skills related to sustainable development within the education» on system. In Ukraine's laws «On Education» and «On Preschool Education the concept of sustainable development is central to state policy, which aims to equip students with basic environmental, social, and economic competencies. In light of this, the research topic is relevant, as it aims to update the content, methods, and forms of environmental education for older preschool-aged children within the framework of sustainable development education.

The development of environmental and natural science competencies in older preschool-aged children within the framework of sustainable development education takes into account their age-related and individual characteristics, particularly their high level of cognitive development and their ability to generalize, analyze, and identify basic cause-and-effect relationships. As O. Veretennikova notes, by the upper preschool age, children are already capable not only of perceiving natural phenomena but also of understanding their interrelationships, which lays the foundation for the formation of a holistic understanding of the environment [4, 5].

Environmental education for older preschoolers should be viewed as a purposeful and systematic process of organizing educational activities aimed at developing knowledge about the natural environment, fostering a value-based attitude toward it, and gaining experience in environmentally sound behavior. Researchers A. Bogush and N. Gavrysh emphasize that it is precisely at this age that children's cognitive activity increases significantly, along with their desire to explain natural phenomena and establish causal relationships [1, p. 95].

Researchers H. Bielenko, N. Horopakha, N. Lysenko, Z. Plokhiy, and T.Ponimanska believe that the older preschool age is a sensitive period for the development of natural and environmental competence. Children in the older preschool age group possess a basic set of concepts about the world around them, which enables them to distinguish between living and non-living objects, establish basic relationships

between them, and recognize how the lives of organisms depend on environmental conditions. Researcher N. Yarysheva notes that it is precisely during this period that children develop the ability to recognize the patterns of natural phenomena, navigate seasonal changes, and understand the causal relationships between changes in nature – all of which are important prerequisites for their future environmental development [3].

It is important to note that the activity-based approach facilitates a transition from the passive absorption of information to its active application in various real-life situations. Children learn to apply their knowledge in practice and to evaluate their own actions in terms of their impact on nature, which contributes to the development of environmentally sound behavior.

A key component of developing ecological and natural science competence within the framework of education for sustainable development is fostering a child's emotional and value-based attitude toward nature. In the older preschool years, the emotional sphere becomes more nuanced: children are capable of empathizing with living beings, showing concern for them, and experiencing joy from interacting with nature. As N. Lysenko notes, the combination of emotional perception of the environment with cognitive activity fosters a lasting interest in nature and an intrinsic motivation to preserve it [2].

Equally important is the creation of a developmentally supportive environmental setting in preschool education institutions. Such an environment should stimulate children's cognitive activity, spark their interest in nature, and create conditions for independent exploration.

Based on the results of our theoretical research, we developed the formative stage of a pedagogical experiment aimed at improving the level of natural and environmental competence among older preschoolers within the context of sustainable development education. The experimental study was conducted at Preschool Educational Institution No. 416 in Kyiv. Twenty-four children of senior preschool age, members of the «Kapitoshka» group, participated in the study.

The content of the formative stage of the experiment was designed so that children would acquire knowledge of nature and the environment not only through explanations, but primarily through their own observations and hands-on experience. The children were encouraged to examine plants, trees, birds, insects, and inanimate objects in nature; compare them; notice changes; answer questions; conduct simple experiments; and carry out simple tasks related to caring for natural objects. As a result, their knowledge of nature gradually became linked to emotional attitudes and practical actions.

In line with the identified need for environmental education starting in preschool, we selected the following interrelated forms and methods: observation walks, purposeful walks and nature excursions, integrated lessons, short-term and long-term observations, nature- and ecology-themed games, moments of nature appreciation, organized work in nature, and practical tasks. Combining these elements allowed us to structure the formative stage sequentially: from the direct perception of natural objects to their comprehension, emotional experience, and practical action.

Let’s highlight the main approaches to developing natural and environmental competence in older preschoolers within the framework of sustainable development education. Observation walks were conducted on the grounds of the preschool while the children were outdoors. For each observation, a specific object or phenomenon was identified: a tree, a flower, a bush, birds at a feeder, insects, clouds, rain, wind, or the ground after rainfall. Care was taken to ensure that the observation had a clear purpose but did not turn into a lengthy explanation. The children were given time to examine the object on their own, express their thoughts, and compare what they had seen.

Nature observation is one of the most effective and nature-based means of developing ecological and natural science competence in older preschool-aged children. It is precisely through direct contact with objects and phenomena in the environment that a child gains initial experience in understanding nature, which

becomes the foundation for developing systematic knowledge, an emotional attitude, and practical skills for interacting with it.

In the older preschool years, observation becomes more deliberate. Children are already capable not only of noting individual features of objects, but also of identifying essential characteristics, establishing connections between phenomena, and drawing basic conclusions. As N. Yarysheva notes, conducting systematic observations helps children develop the ability to recognize patterns in nature, understand changes occurring in their environment, and recognize their causes [3].

While observing flowers, children were asked to identify their color, shape, height, and the condition of their leaves and petals. Special attention was paid to the soil: whether it was dry or moist, and whether the plant needed water. After the discussion, simple hands-on activities were organized: watering the flowers, removing dry leaves, and carefully examining the plant. In this way, the children saw that the plant is alive – it grows, changes, and requires care.

A significant part of the program was devoted to observing seasonal changes. The children were encouraged to notice how nature changes in the fall, winter, spring, and summer. In the fall, attention was focused on the leaves turning yellow, fallen leaves on the ground, cooler air, rain, and changes in the behavior of birds and insects. In winter, discussions focused on why trees lose their leaves, why it’s harder for birds to find food, and why snow falls. In spring, the children observed the first flowers, buds on the trees, and the return of the birds. In summer, attention was drawn to the warmth of the sun’s rays, the bright sunshine, the greenery, the flowers, and the insects.

An important teaching technique in the observation process is comparison, which allows children to gain a deeper understanding of the characteristics of natural objects and phenomena. By comparing different natural objects or their states, children learn to identify essential characteristics and identify differences and similarities, which helps them form generalizations. For example, comparing the behavior of plants and animals

under different weather conditions helps them understand how these organisms depend on environmental factors.

Nature walks were used to broaden the children's experiences. They took place on the grounds of the preschool, near the flower bed, trees, bushes, and bird feeders. Before each nature walk, the children were reminded of the rules of conduct: do not break branches, do not pick flowers unnecessarily, do not startle birds and insects, do not step on plants, and do not leave trash behind. During field trips and nature walks, the children were encouraged to closely observe natural objects, compare them, and share their impressions. After the field trips and nature walks, a brief discussion took place: what they saw, what surprised them, what they liked, and what needs to be protected.

Integrated and game-based activities complemented the observations and helped the children synthesize their experiences. The series of integrated lessons focused on nature and the environment and covered the following topics: «Living and Non-Living Nature» «What Plants Need to Survive», « Who Lives Where», «Seasons and Their Characteristics», «How to Help Birds», «Rules of Conduct» in Nature «Why We Must Protect Nature», «Why It's Important to Sort Trash», «Water – the Source of Life», «A Second Life for Things», «All Living Things Are Important», «The Air We Breathe», «The Weather Changes – Let's Observe and Explore». The integrated lessons incorporated illustrations, natural materials, discussions, simple experiments, hands-on activities, and educational games.

Problem-based questions were used during lessons, walks, and observations. The children were asked to think about what would happen if a plant were not watered; why birds need help in the winter; why one shouldn't destroy an anthill; why plants look fresher after rain; and what would happen if trash were left on the grass. Such questions helped them move from simply knowing a rule to understanding its meaning.

An important part of the method was taking a moment to appreciate nature. These moments were brief and took place without unnecessary explanations. The

children were invited to quietly observe a flower, a tree after the rain, clouds, an autumn leaf, a ray of sunshine, or a bird on a branch. Afterward, the children shared their impressions: what they liked, what colors they noticed, what the flower or cloud resembled, and what mood the sight evoked. These moments helped foster an emotional connection with nature. A child cherishes what brings them joy, wonder, and affection.

Nature- and ecology-themed games were used to reinforce knowledge and rules of behavior. In the older preschool years, play remains a familiar form of activity for children, so nature-related material was best absorbed precisely through play situations. The games used included «Who Lives Where?», «When Does This Happen?», «Good or Bad?», «Help the Plant», «What Does a Plant Need?», and Pick «Out the Odd One Out».

Hands-on tasks were a mandatory part of the formative experiment. The children watered houseplants, helped tend to the flower bed, raked up dry leaves, filled the bird feeder with food, observed birds, and kept the grounds clean. Before each activity, the children discussed why it was necessary. For example, before watering a plant, the children were asked to determine whether the soil was dry, whether the plant needed water, and how to water it without damaging it.

Positive changes gradually became apparent during the formative experiment. The children paid more attention to natural objects and noted on their own that the leaves had turned yellow, the ground was wet after the rain, birds had flown to the feeder, and the flowers needed water. They responded more actively to questions, were more eager to participate in caring for the plants, and were better able to explain why we need to protect nature.

These experiences were reinforced through other activities. The children drew the flowers, trees, and birds they had seen; created collages using natural materials; wrote short stories; played educational games; and discussed rules of behavior in nature. This helped make the experience more holistic, as the children not only

observed natural objects but also revisited them through conversation, play, creativity, and hands-on activities.

When discussing problem situations, most of the preschoolers suggested helping the beetle, watering the wilted plant, putting out food for the birds, and picking up trash. While their responses were often brief and formulaic at first, they gradually became more substantive: «The beetle is alive», «A flower will wilt without water», «The birds are cold and hungry», «You can't leave trash behind because it will make the area dirty and harm nature».

The study showed that developing natural and ecological competence in older preschool-aged children requires not just occasional activities but systematic work in which knowledge about nature is combined with emotional attitudes and practical actions. The results of the initial and follow-up assessments showed that the most noticeable changes occurred when children directly observed natural objects, compared them, asked questions, cared for plants, helped birds, and participated in nature conservation activities.

Conclusions. The results of the study showed that nature observation is an effective means of developing natural and environmental competence in older preschool-aged children. The best results from nature observation are achieved when a clear goal is set for the observations, they are conducted systematically, and they are combined with various types of activities. Among the effective forms and methods, we highlight: purposeful walks, integrated lessons, nature- and ecology-themed games, and moments of nature appreciation.

A future focus of our research is the development of recommendations for educators and parents regarding the development of natural and environmental competence in older preschool-aged children within the context of education for sustainable development. The issue of collaboration between preschool institutions and families in fostering environmentally sound behavior in children also requires further analysis. It is advisable to develop a system of joint environmental protection tasks for

children, teachers, and parents that will help reinforce the acquired knowledge and skills not only within the preschool setting but also in the child's everyday life.

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