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# Ways of Organizing Experimental Research on Forming A Value-Based Attitude Toward Nature in Preschool Children Through Environmental Knowledge

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## ABSTRACT

This article examines the theoretical and practical foundations of developing a value-based attitude toward nature in preschool children through environmental knowledge. The study emphasizes the importance of environmental education in fostering children's ecological awareness, environmental culture, and responsible behavior toward the natural environment from an early age. Special attention is given to integrating environmental content into preschool educational activities by applying observation, experimental learning, play-based instruction, project-based activities, and practical tasks that encourage active participation. The paper presents a methodology for organizing experimental research aimed at assessing the effectiveness of environmental education in improving children's ecological knowledge, emotional appreciation of nature, and environmentally responsible behavior. Evaluation criteria and indicators for experimental and control groups are also described. The findings demonstrate that the systematic application of innovative pedagogical technologies, interactive teaching methods, and close cooperation with parents significantly improves children's environmental competence, cognitive engagement, and value orientations related to nature conservation. The proposed methodological recommendations may contribute to enhancing environmental education practices in preschool institutions and supporting the formation of environmentally responsible future citizens in accordance with the principles of sustainable development.

**Keywords:** Environmental knowledge, environmental education, preschool education, value-based attitude toward nature, experimental research, environmental culture, interactive methods, sustainable development.

## INTRODUCTION

Under conditions of global environmental change, environmental degradation, and increasing anthropogenic pressure, the problem of developing environmental culture among the younger generation has become particularly relevant. International documents on sustainable development emphasize the need to nurture environmentally responsible individuals from an early age. Preschool age is regarded as the most favorable period for establishing the foundations of environmental awareness, developing a value-based attitude towards nature, and fostering environmentally responsible behavior. During this period, children's worldview orientations are established, their initial understanding of the relationship between humans and nature is developed, and the foundations of a moral attitude towards the surrounding world are formed.

The modern preschool education system is focused not only on the intellectual development of children but also on nurturing individuals who possess humanistic and environmental values. In this regard, environmental education has become one of the priority areas of the educational process. Its primary objective is not merely to

provide children with basic knowledge about nature but also to develop a positive emotional attitude towards the environment, a sense of responsibility for preserving natural resources, and a caring attitude towards plants, animals, and natural objects [1].

Scientific studies conducted by both domestic and international researchers indicate that environmental knowledge has a positive impact on the development of children's cognitive activity and contributes to the formation of moral qualities, observation skills, curiosity, and environmental thinking. However, an analysis of practices in preschool educational institutions reveals that, in many cases, environmental education is limited to individual thematic lessons and lacks a systematic approach. Modern interactive technologies, experimental activities, research-based assignments, and practical forms of children's interaction with the natural environment are not sufficiently utilized. Furthermore, close cooperation between teachers and parents in developing environmental values is not always ensured.

The organization of experimental and research activities is of particular importance in identifying the pedagogical conditions necessary for effectively developing preschool children's value-based attitudes towards nature. Conducting a pedagogical experiment makes it possible to objectively assess the level of children's environmental knowledge, identify changes in their emotional and value-related development, determine the effectiveness of the pedagogical technologies employed, and develop practical recommendations for improving the educational process [2].

The formation of a value-based attitude towards nature is a complex pedagogical process involving cognitive, emotional, and behavioral components. The cognitive component involves children's acquisition of basic environmental knowledge and understanding of natural phenomena. The emotional component is associated with developing admiration for the beauty of nature, empathy towards living organisms, and an awareness of their intrinsic value. The behavioral component is expressed through the development of environmentally responsible behavioral skills, a willingness to participate in environmental protection activities, and adherence to appropriate rules for interacting with the natural environment.

The purpose of this study is to provide a scientific justification for the pedagogical conditions required to organize experimental and research activities aimed at developing preschool children's value-based attitudes towards nature through environmental knowledge, as well as to determine the effectiveness of the proposed methodology. Achieving this objective involves analyzing psychological and pedagogical literature, developing assessment criteria for children's environmental awareness, conducting a pedagogical experiment, and performing a comparative analysis of the results obtained in the experimental and control groups. The practical significance of the study lies in the possibility of implementing the proposed environmental education model in preschool educational institutions to improve the quality of environmental education and foster environmentally responsible individuals [3].

## LITERATURE REVIEW

The problem of developing preschool children's value-based attitudes towards nature occupies a central place in contemporary research on environmental education and education for sustainable development. In recent years, the academic community has increasingly viewed environmental education not merely as a process of providing children with basic knowledge about the environment but also as an important mechanism for developing environmental awareness, moral values, and responsible personal behavior. Contemporary studies indicate that preschool age is the most favorable period for establishing environmental culture, as children's emotional development, cognitive interests, and fundamental value orientations are actively developing during this stage.

According to the research conducted by J. Davis (2022), environmental education for preschool children should be based on the principles of Education for Sustainability, which involve children's active interaction with the natural environment, participation in research activities, and engagement in practical environmental problem-solving tasks. The author emphasizes that effective environmental education is impossible without establishing an emotional connection between children and nature and developing their personal responsibility for environmental preservation. Particular attention is given to integrating environmental content into all types of preschool activities, which contributes to the comprehensive development of the child.

S. Elliott and J. Davis (2020) consider environmental

education to be a continuous pedagogical process aimed at developing children's environmental competence through educational games, project-based activities, observations, and practical investigations. According to the researchers, modern educational programmes should focus not only on the acquisition of environmental knowledge but also on developing the skills necessary to make environmentally responsible decisions. The authors emphasize the importance of active family participation in children's environmental education, since cooperation between teachers and parents ensures the sustainability of the environmental values being developed.

In their review of scientific literature, M. Hedefalk, J. Almqvist, and L. Östman emphasize that educational programmes based on inquiry-based learning, nature observation, and children's practical activities achieve the most significant results. The authors point out that the development of environmental values should be regarded as an integrated pedagogical process combining the cognitive, emotional, and behavioral components of a child's personality.

UNESCO publications have made a significant contribution to the development of the concept of environmental education. The documents Education for Sustainable Development Goals: Learning Objectives and Education for Sustainable Development: A Roadmap emphasize that education is one of the key factors in achieving the Sustainable Development Goals. Particular attention is given to developing environmental thinking, establishing value orientations, acquiring practical environmental protection skills, and fostering active citizenship from the preschool education stage. These documents also recommend creating an educational environment that encourages children's participation in real environmental initiatives and promotes close cooperation between educational institutions, families, and local communities.

Contemporary international studies confirm that the effectiveness of environmental education increases considerably when an integrative approach is employed, combining play-based activities, artistic and creative development, research projects, and children's direct interaction with the natural environment. Recent studies demonstrate that such pedagogical technologies contribute to the development of environmental thinking, critical analysis, communication skills, and the ability to make environmentally informed decisions. In addition, researchers emphasize the importance of creating a community of participants in the educational process, including teachers, parents, and local communities, which ensures the continuity and practical orientation of environmental education.

In the Republic of Uzbekistan, environmental education has also acquired strategic importance. Within the framework of implementing the Development Strategy of New Uzbekistan and the state policy aimed at modernizing preschool education, particular attention is paid to nurturing an environmentally literate generation capable of recognizing the value of natural resources and actively participating in their preservation. The State Educational Standard for Preschool Education guides teachers towards introducing modern educational technologies, developing environmental culture, and fostering practical skills for caring for nature.

An analysis of domestic and international research demonstrates that, despite the considerable number of scientific studies devoted to environmental education for preschool children, the organization of experimental and research activities specifically aimed at developing value-based attitudes towards nature through environmental knowledge remains insufficiently explored. This highlights the relevance of the present study, which aims to provide a scientific justification for the pedagogical conditions required to organize experimental and research activities and to evaluate the effectiveness of the proposed methodology for developing preschool children's value-based attitudes towards nature.

## METHODS

The methodological foundation of the study consisted of contemporary scientific approaches to environmental education, learner-centered education, the competency-based approach, and the pedagogy of sustainable development. In organizing the experimental and research activities, consideration was given to the psychological characteristics of preschool-aged children, the patterns of cognitive activity development, the formation of the emotional and value-related sphere, and the development of an individual's environmental culture. The study was conducted at a preschool educational institution involving children of senior preschool age, teachers, and parents.

To achieve the stated research objective, a comprehensive set of complementary theoretical and empirical research

methods was employed. The theoretical methods included the analysis of philosophical, psychological, pedagogical, and methodological literature on environmental education; the examination of state educational standards, regulatory documents, and contemporary scientific publications; as well as the systematization, generalization, and comparative analysis of scientific concepts. These methods made it possible to determine the essence of the concept of a "value-based attitude towards nature," identify the structural components of children's environmental awareness, and develop a conceptual research model.

The empirical component of the study included pedagogical observation, individual and group interviews with children, questionnaires for teachers and parents, diagnostic assignments, a pedagogical experiment, and the analysis of children's creative and practical work. Particular attention was paid to observing children's behavior in natural environments, during outdoor activities, excursions, environmental campaigns, practical work in nature corners, and participation in environmental protection activities. The collected data were recorded in diagnostic assessment sheets and subsequently subjected to qualitative and quantitative analysis [4,5].

The experimental and research activities were organized in three interrelated stages. At the ascertaining stage, the initial levels of children's environmental knowledge, emotional attitudes towards nature, and environmentally responsible behavior were determined. For this purpose, specially developed diagnostic tasks were used to assess children's understanding of natural phenomena, knowledge of environmental behavior rules, ability to establish cause-and-effect relationships, and willingness to demonstrate care for living organisms.

At the formative stage, an original system of pedagogical activities aimed at developing value-based attitudes towards nature through environmental knowledge was implemented. Environmental games, thematic discussions, observations of seasonal changes, simple experiments, research assignments, project-based activities, artistic and creative tasks, environmental fairy tales, environmental situation modelling, and collective environmental protection campaigns were integrated into the educational process. Considerable attention was given to the application of interactive teaching methods, problem-based situations, game-based technologies, and the organization of collaborative activities involving children, teachers, and parents.

The control stage of the study involved repeated diagnostics of the level of children's environmental knowledge and their value-based attitudes towards nature. Comparing the results of the ascertaining and control stages made it possible to determine the effectiveness of the developed methodology. Assessment was conducted according to three criteria: cognitive (level of environmental knowledge), emotional and value-based (attitudes towards nature, empathy, and sense of responsibility), and activity-based (environmentally appropriate behavior and participation in environmental protection activities). Three levels of development were identified for each criterion: high, medium, and low [6,7].

The processing of the obtained results was carried out using mathematical statistical methods, including the calculation of percentage distributions, comparative analysis of the results of the control and experimental groups, calculation of mean values, and assessment of changes over time. The integrated application of qualitative and quantitative methods ensured the objectivity of the study, the reliability of the findings, and the possibility of scientifically substantiating the effectiveness of the proposed methodology. The developed methodology can be applied in preschool educational institutions to improve the environmental education system, enhance children's environmental awareness, and foster a sustainable value-based attitude towards nature.

**Comparative indicators of the development of value-based attitudes towards nature among preschool children**

**Table 1.**

| Indicators | Experimental group (before) | Experimental group (after) | Control group (before) | Control group (after) |
|---|---|---|---|---|
| High level | 20 | 58 | 22 | 33 |
| Medium level | 45 | 35 | 43 | 47 |

| | | | | |
|---|---|---|---|---|
| Low level | 35 | 7 | 35 | 20 |

The results of the experimental and research activities demonstrate the positive impact of the developed pedagogical methodology on the formation of value-based attitudes towards nature among preschool children. A comparative analysis of the data obtained from the experimental and control groups revealed statistically significant positive changes across all the indicators examined in the experimental group following the completion of the formative stage of the study.

As shown in Table 1, the proportion of children demonstrating a high level of development of value-based attitudes towards nature in the experimental group increased from 20% to 58%, representing an increase of 38 percentage points. This indicates a substantial improvement in environmental knowledge, conscious attitudes towards natural objects, and readiness to observe environmentally responsible behavioral practices. At the same time, the proportion of children with a low level decreased from 35% to 7%, confirming the effectiveness of the systematic application of environmental games, observations, research activities, practical sessions, and project-based methods within the educational process.

The control group also demonstrated a certain degree of positive progress; however, the changes were considerably less pronounced. The proportion of children with a high level increased only from 22% to 33%, while the percentage of children with a low level decreased from 35% to 20%. These changes can be attributed to children's natural age-related development and the implementation of the traditional educational programme without a specially organized system of environmental education.

Particular attention should be paid to the changes in the medium-level indicators. In the experimental group, this proportion decreased from 45% to 35%, as a considerable number of children progressed to the high level of environmental value development. In contrast, the medium-level indicator in the control group did not undergo substantial changes, increasing only from 43% to 47%, which indicates the absence of pronounced positive dynamics.

The obtained results make it possible to conclude that the integrated application of environmentally oriented pedagogical technologies, including game-based methods, nature observations, elementary environmental experiments, project activities, artistic and creative assignments, and active cooperation with parents, significantly improves the effectiveness of developing value-based attitudes towards nature among preschool children.

Thus, the results of the pedagogical experiment confirm the research hypothesis and demonstrate that the proposed methodology contributes to the development of environmental culture, the expansion of environmental knowledge, the formation of emotionally positive attitudes towards the environment, and the consolidation of environmentally responsible behavioral skills. This provides grounds for recommending the proposed system for wider implementation in preschool educational institutions as an effective means of improving environmental education for children.

## RESULTS AND DISCUSSION

The results of the experimental and research activities confirmed the effectiveness of the developed pedagogical methodology aimed at fostering value-based attitudes towards nature among preschool children through environmental knowledge. A comparative analysis of the data obtained at the ascertaining and control stages of the study revealed pronounced positive dynamics in the experimental group across all the criteria examined: cognitive, emotional-value, and activity-based. This indicates that the systematic organization of environmentally oriented educational activities contributes not only to expanding children's environmental knowledge but also to developing their environmental culture, moral qualities, and responsible behavior towards the natural environment.

At the initial stage of the study, the majority of children in both the experimental and control groups demonstrated predominantly medium and low levels of environmental knowledge and value-based attitudes towards nature. Many children experienced difficulties in explaining cause-and-effect relationships between natural phenomena, did not always recognize the importance of treating plants and animals with care, and were not sufficiently confident in applying environmentally

appropriate behavioral rules in everyday life. Following the implementation of the formative stage of the study, the situation in the experimental group changed considerably.

The application of a comprehensive set of pedagogical tools, including environmental games, observations of natural objects, elementary research activities, practical experiments, creative assignments, project-based activities, and joint activities with parents, significantly increased children's cognitive engagement. The children began to demonstrate greater interest in natural phenomena, ask questions more actively, independently suggest ways of caring for plants and animals, and show initiative in carrying out environmental tasks. Children's emotional responsiveness also increased substantially, as reflected in their willingness to protect living organisms, maintain environmental cleanliness, and participate in environmental protection activities.

The quantitative indicators obtained confirmed the qualitative changes identified through pedagogical observations. The significant increase in the number of children demonstrating a high level of value-based attitudes towards nature, together with the simultaneous reduction in the number of children with a low level, indicates the high effectiveness of the proposed methodology. Particularly noticeable changes were recorded in the emotional-value component, since regular interaction with nature, direct observations, and practical activities help develop a lasting sense of responsibility for environmental preservation among children.

The results of the control group also demonstrated certain positive changes; however, their intensity was considerably lower than that observed in the experimental group. This confirms that traditional forms of environmental education provide only a limited effect, whereas an integrated approach based on combining environmental knowledge, practical activities, and active family participation is considerably more effective. The study established that the integration of various types of children's activities — play-based, cognitive, research-oriented, artistic and creative, and practical work — ensures more sustainable outcomes in the development of environmental values.

The findings are consistent with contemporary scientific perspectives that regard environmental education as a continuous pedagogical process aimed not only at transferring knowledge but also at developing environmental awareness, moral attitudes, and environmentally responsible personal behavior. The practical orientation of educational sessions, the use of problem-based situations, environmental projects, research assignments, and observations in natural environments contribute to a deeper understanding of environmental knowledge and its conscious application in everyday life.

It should be noted that active cooperation between teachers and children's parents was an important condition for the success of the developed methodology. The joint participation of families and preschool educational institutions in environmental campaigns, competitions, excursions, and environmental protection activities established a unified educational environment. This positively influenced the consolidation of environmentally appropriate behavior among children both within the educational institution and at home.

Thus, the results of the conducted study demonstrate the high effectiveness of the proposed system for developing value-based attitudes towards nature among preschool children through environmental knowledge. The developed methodology contributes to the comprehensive development of environmental competence, the emotional and moral sphere, and practical skills associated with environmentally responsible behavior. Its implementation in preschool educational institutions may become one of the effective approaches to improving environmental education, enhancing the quality of educational activities, and establishing the foundations of environmental culture among the younger generation in accordance with contemporary requirements for the sustainable development of society [8–10].

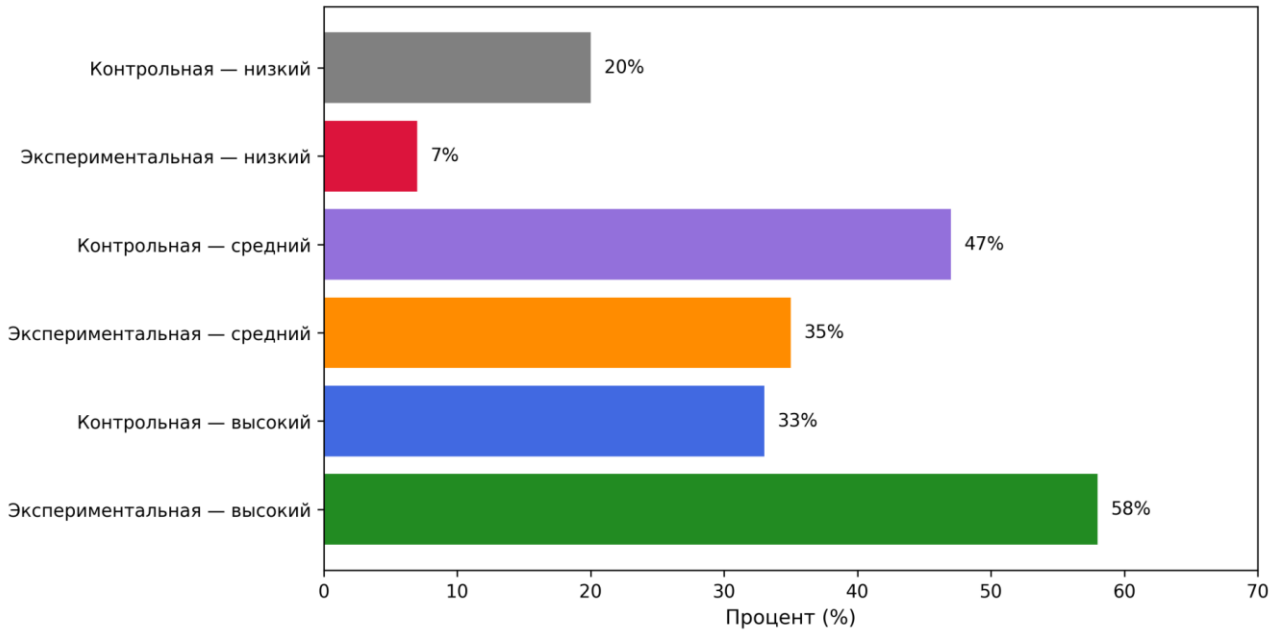



**Figure 1. Dynamics of the levels of development of value-based attitudes towards nature among preschool children in the experimental and control groups following the experimental study**

The data presented in Figure 1 clearly demonstrate the positive dynamics in the development of value-based attitudes towards nature among preschool children following the implementation of the developed pedagogical methodology based on environmental knowledge. A comparative analysis of the results obtained from the experimental and control groups indicates significant differences in the levels of development of the examined indicators after the completion of the formative stage of the pedagogical experiment.

The most significant changes were observed in the experimental group, where the proportion of children demonstrating a high level of development of value-based attitudes towards nature reached 58%, whereas the corresponding indicator in the control group was 33%. These findings demonstrate the high effectiveness of the integrated application of environmentally oriented pedagogical technologies, including observations of natural objects, research activities, environmental games, practical assignments, and project-based teaching methods.

Particular attention should be paid to the decrease in the number of children demonstrating a low level of environmental value development. In the experimental group, this indicator decreased to 7%, whereas in the control group it remained at 20%. This makes it possible to conclude that a specially organized system of environmental education contributes more effectively to the development of environmental awareness, emotional and value-based attitudes towards the environment, and skills associated with environmentally responsible behavior.

An analysis of the medium-level indicators also confirms the effectiveness of the developed methodology. A considerable proportion of children in the experimental group progressed from the medium level to the high level of environmental value development, indicating the sustainability of the positive changes achieved. In the control group, such dynamics were considerably less pronounced, which can be explained by the use of traditional forms of environmental education without implementing a specially developed experimental programme.

Thus, the results presented in the figure confirm that the implementation of a pedagogical system based on environmental knowledge, interactive teaching technologies, and practice-oriented activities ensures a

substantial improvement in the level of development of value-based attitudes towards nature among preschool children. The obtained findings support the research hypothesis and demonstrate the potential for the widespread application of the proposed methodology in preschool educational institutions to improve environmental education and foster environmental culture among the younger generation.

## CONCLUSION

The conducted study confirmed that the formation of value-based attitudes towards nature among preschool children represents one of the most important areas of contemporary environmental education. The results of the experimental and research activities indicate that the systematic application of environmental knowledge within the educational process contributes not only to expanding children's understanding of the environment but also to developing environmental awareness, emotionally positive attitudes towards nature, and skills associated with environmentally responsible behavior.

The study established that the effectiveness of environmental education increases considerably through the integrated application of modern pedagogical technologies, including game-based methods, observations, elementary research activities, practical experiments, project-based activities, creative assignments, and environmental protection initiatives. The organization of children's active cognitive engagement plays a particularly important role, as it ensures their direct interaction with both living and non-living natural objects. Practical experience is precisely what facilitates a deeper understanding of environmental knowledge and its transformation into sustainable personal values.

The results of the pedagogical experiment demonstrated that the developed methodology had a significant positive impact on the level of development of value-based attitudes towards nature among children in the experimental group. An increase was observed in the number of children with a high level of environmental awareness, accompanied by enhanced cognitive activity, improved emotional responsiveness towards natural objects, and the development of stable motivation for environmentally responsible behavior. Positive changes were also identified in the control group; however, their magnitude was considerably lower, confirming the advantages of a specially organized system of environmental education.

The study also made it possible to conclude that the successful development of environmental values is impossible without close cooperation between teachers, families, and preschool educational institutions. The coordination of educational influences and the joint participation of parents and children in environmental projects, excursions, campaigns, and practical environmental protection activities considerably enhance the effectiveness of the educational process and ensure the sustainability of the achieved results.

The practical significance of the study lies in the possibility of applying the proposed methodology in preschool educational institutions to improve the content of environmental education, develop educational programmes, organize experimental and research activities, and enhance teachers' professional competence in the field of environmental education. The methodological recommendations presented in this study can serve as a foundation for introducing innovative approaches and methods aimed at developing environmental culture among preschool children.

Future research prospects are associated with the development of environmentally oriented digital educational resources, the improvement of diagnostic tools for assessing children's environmental competence, and the investigation of opportunities for integrating environmental education with other areas of preschool education within the framework of sustainable development principles. The implementation of these research directions will contribute to improving the quality of environmental education and fostering a generation characterized by a high level of environmental culture, a responsible attitude towards nature, and a willingness to protect the environment.

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