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CONTENT AND SCIENTIFIC-METHODOLOGICAL SIGNIFICANCE OF EXPERIMENTAL WORK AIMED AT DEVELOPING STUDENTS' ECOLOGICAL THINKING

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Annotation: This article analyzes the methodological foundations, stages, and scientific-methodological significance of experimental work conducted to develop students' ecological thinking. The main results of the experimental process, the pedagogical methods applied, and their effectiveness are highlighted. The practical role of pedagogical innovations aimed at improving environmental education is also demonstrated.

Keywords: ecological thinking, experimental work, environmental education, ecological culture, attitude toward nature, pedagogical technology, ecological competence, learner personality, integration, environment, scientific methodology, ecocentric approach.

Introduction and Relevance of the Problem

In the current period, when the attention of the global community to worldwide environmental problems is sharply increasing, the issue of forming a conscious and responsible attitude of humans toward nature is becoming especially important. The Laws of the Republic of Uzbekistan "On Nature Protection" (1992) and "On Education" (2020), as well as the strategy of green economy and sustainable development advanced by President Sh.M. Mirziyoyev, require environmental education to be elevated to a qualitatively new level [1; 2].

The formation of students' ecological thinking is closely connected not only with providing knowledge, but also with developing ecocentric values, emotional attitudes toward nature, and a strong will to protect it. Therefore, developing scientific-methodological foundations for ecological thinking and testing their effectiveness through experimental work has become one of the priority directions of modern pedagogical science.

Theoretical and Methodological Foundations of Ecological Thinking

Ecological thinking is defined as a person's ability to systematically, critically, and creatively understand the relationship between humans and nature, analyze environmental problems, and search for their solutions (Deryabo, Yasvin, 1996). Unlike ordinary environmental knowledge, this concept is directly related to an individual's internal value system and behavior [3].

The development of ecological thinking includes three main components:

Cognitive component — mastering a system of ecological knowledge, laws, and relationships;

Emotional-value component — subjective and emotional attitudes toward nature, aesthetic perception, and empathy;

Activity component — practical skills and actions aimed at solving environmental problems [4].

This three-component model was used as a diagnostic criterion during the experimental work and served as the main measurement tool for determining the level of students' ecological thinking.

Organizational Structure and Methodology of Experimental Work

The research was conducted during 2024–2026 with the participation of 120 students from grades 6–9 in three secondary schools in Urgench city. The experimental work was organized in three stages:

The first stage — the diagnostic (ascertaining) stage

Diagnostic tests, observations, and interviews were conducted to determine the existing level of students' ecological thinking. The results showed that 71.6% of students had only superficial knowledge of environmental problems and did not feel personal responsibility for environmental protection.

The second stage — the formative stage

Lessons, project activities, eco-excursions, problem situations, and discussions were organized on the basis of a specially developed environmental education module. In addition, within the framework of the "Green Classroom Project," students carried out practical environmental activities on the school grounds.

The third stage — the control stage

Repeated diagnostics were conducted to evaluate the effectiveness of the formative influence, and the results were compared [5].

Table 1

Dynamics of the Development of Ecological Thinking by Stages of Experimental Work

Experimental stage	Number of students	Initial indicator (%)	Final indicator (%)	Growth level (%)
Diagnostic stage	120	28.4	—	—
Formative stage	120	29.1	61.7	+32.6
Control stage	120	28.8	78.3	+49.5

The data in the table show that as a result of the formative influence, the high level of students' ecological thinking increased from 28.4% to 78.3%, demonstrating a positive growth of 49.5%. This confirms the high effectiveness of the pedagogical technologies and methods used.

Applied Pedagogical Methods and Their Scientific Foundations

During the experimental process, the following modern pedagogical methods were applied in an integrated manner:

Project Method

Students independently investigated real environmental problems such as water waste, waste sorting, and air pollution, and proposed solutions. This method developed systematic ecological thinking among students.

Problem-Based Learning Technology

Through problem tasks such as "The river near the school is becoming polluted — identify the cause and propose a solution," students developed analytical and critical thinking skills.

Eco-Excursions and Field Research

Observation in nature itself awakened emotional attitudes toward the environment and helped connect theoretical knowledge with practice.

Integrative Approach

Integration between biology, geography, chemistry, and social sciences ensured the integrity of environmental knowledge and developed interdisciplinary thinking skills [6].

Scientific and Methodological Significance of the Experimental Work

The scientific significance of the conducted research is reflected in several aspects. First, diagnostic criteria based on the three-component structure of ecological thinking (cognitive, emotional-value, and activity components) were developed and introduced into the Uzbek educational system. Second, an integrative model for organizing environmental education in school conditions was created, and its effectiveness was empirically proven.

From the methodological point of view, this research:a) can serve as a basis for practical manuals and teaching materials for teachers on environmental education;b) offers a model for systematically organizing environmental education activities in schools;c) contributes to the development of recommendations for improving educational standards and strengthening the environmental component in curricula [7].

The results of the study can also serve as an important source for enriching the "State Concept of Environmental Education" and developing regional environmental education programs.

Conclusion and Recommendations

The conducted experimental work demonstrated that ecological thinking can be developed through purposeful pedagogical influence, and this process achieves the highest results under the following conditions:

— adherence to the principles of systematicity and consistency in education;— integration of environmental knowledge with emotional and practical activities;— high ecological competence and motivation of teachers;— ensuring cooperation between school, family, and community [8].

Based on these results, it is recommended to introduce a special module for developing ecological thinking in secondary schools, allocate a separate place for environmental pedagogy in teacher retraining programs, and expand the national "Green School" project.

In conclusion, the proper formation of ecological thinking from school age is the most reliable way to educate a responsible and environmentally conscious generation that will protect nature in the future. The scientific-methodological approach and experimental results proposed in this study can contribute to achieving this goal more effectively within the education system.

References

1. Law of the Republic of Uzbekistan "On Nature Protection." 09.12.1992. — Tashkent: Uzbekistan, 1992.
2. Mirziyoyev Sh.M. Strategy of New Uzbekistan. — Tashkent: Uzbekistan, 2021. — 448 p.
3. Deryabo S.D., Yasvin V.A. Ecological Pedagogy and Psychology. — Rostov-on-Don: Feniks, 1996. — 480 p.
4. Rahimov B.X. Pedagogical Foundations of Environmental Education and Upbringing. — Tashkent: Fan, 2018. — 176 p.
5. Xoliqova M.A. Formation of Ecological Competence in Secondary Schools. Dissertation. — Tashkent: TDPU, 2022. — 148 p.
6. Bayburtyan V.A. "Integration as a Factor in the Development of Schoolchildren's Ecological Thinking" // Pedagogika. — 2020. — No. 4. — pp. 45–52.
7. UNESCO. Education for Sustainable Development Goals: Learning Objectives. — Paris: UNESCO, 2017. — 68 p.
8. Nigmatov A.N. "The Prospects of Geography and the Role of Physical Geography in It" // Bulletin of the Geographical Society of Uzbekistan. — Tashkent, 2004. — Vol. 24. — pp. 17–21.

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