

ISSUES OF INTEGRATIVE ECOLOGICAL EDUCATION AND EDUCATION IN PHYSICS LESSONS

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Abstract. *The work under review reveals the content of physical and environmental education, mastered by students in the process of studying physics together with other natural sciences, as well as in the process of acquiring basic environmental skills by high school students. The ways and methods of teaching environmental knowledge and skills to schoolchildren in physics lessons and extra-curricular activities are shown.*

Keywords: *physics, biology, chemistry, ecology, nature, climate, ecological education, ecological culture, environment, biosphere.*

Today's natural-scientific landscape of the world around us cannot be imagined without taking into account the ecological problems that are becoming an urgent issue every day. At present, the interaction of society and nature has become so close due to the emergence of new branches of science, technology, production and the expansion of the sphere of influence of human labor on the environment that human interference with nature can no longer be disordered and without limits. . It should be regulated in a certain way rather than continue in this state; otherwise, humanity may face a dangerous environmental disaster no less than when a nuclear bomb explodes.

In order to prevent the negative consequences of human intervention and interference with nature, it is necessary to solve a number of scientific-technical, socio-political, economic and other problems. . The growing young generation should be ready for a careful attitude to the natural environment that surrounds us and a scientific approach, starting from the threshold of school. It is for this reason that the idea of “ecologicalization” of educational subjects (that is, reflecting the tasks of forming ecological culture in schoolchildren in their content and teaching methodology) has become very important today. Physics today, that is, in the conditions of the rapid development of science and technology, plays a major role in introducing young people to the issues of nature protection and rational use of its resources. and is based on the creation of technologies and the creation of various methods and means of environmental protection.

On October 17-18, 2023, the President of the Republic of Uzbekistan Sh.M. Mirziyoev took part in the plenary meeting and gave a speech on the topic "Together build a "green" silk thread in the interests of human and nature living in harmony" and in his speech clearly showed how urgent and important the issue of ecology.

In the process of teaching physics, providing environmental education and upbringing to schoolchildren, first of all, the formation of their ideas about the integrity of nature, the connection between the events occurring in it and their causes, the relationship between man and nature disruption of some natural processes as a result of interaction; It is related to increasing confidence in the need to use the environment wisely and protect it from any pollution, to use scientific ideas and discoveries to “neutralize” the negative consequences of scientific and technical progress. (for example, harmful physical factors such as noise, vibration, electromagnetic fields of different

frequencies, widespread use of electrical equipment in production and at home, an increase in the number and power of radio and television stations, radar devices, etc., etc.). Thus, from the environmental crisis that arose on the basis of modern physics and technical achievements (the development of atomic energy and the use of renewable energy sources, the use of magnetohydrodynamic devices, the latest measuring equipment and electronic computers, space methods of environmental control, etc.) Suggesting possible ways out is another important aspect of environmental education in student physics education.

While studying the course of physics, students will learn about the relationship between society and nature, the importance of the atmosphere for the existence of life on Earth, the main sources of its pollution, the impact of these pollutions on the environment and life processes, living nature from the influence of harmful physical factors protective measures, they should have a clear idea about the possible harmful consequences of the change of the natural environment (including those that schoolchildren themselves participate in). This can be done without expanding or overloading the program, but by focusing students' attention on environmental issues that are closely related to the educational material, and by organizing appropriate extracurricular activities.

The environmental orientation of physics teaching is mainly based on some physical quantities (light, temperature, humidity, pressure, etc.), and phenomena (light, temperature, humidity, pressure, etc.) as certain physical quantities, as well as phenomena (wind, noise, vibrations, different types of radiation, etc.) and practical issues (for example, the use of different types of energy - mechanical, electric, nuclear, geothermal, solar, etc.), their role in natural processes or the positive impact of scientific and technical progress on them and strengthened due to the impact of physical and technical methods and means of nature protection. This allows schoolchildren to have a deeper, more complete and correct understanding of the increasingly complex interaction of society and nature, to be aware of the dangers of improper human intervention in its life, to protect nature and their enables the correct use of information about the correct use of resources. Natural resources, which they receive from popular scientific literature, radio and television programs, films, etc., should be oriented to the assessment of the ecological consequences of some technical solutions and the use of physical knowledge for active protection of the environment.

The latter is very important in an educational sense, because the "greening" of school subjects includes not only introducing schoolchildren to environmental problems, but also making them behave carefully and responsibly with nature. This attitude develops most successfully in the course of practical measures for environmental protection.

So, the introduction of elements of ecology into the educational process of physics, on the one hand, helps to strengthen the ideological-political, worldview content aspects of the lesson, and on the other hand, in order to conduct it more effectively, its polytechnic, school students helps to increase labor orientation in order to effectively prepare them for various sectors of the economy. Because the preparation of schoolchildren to participate in any sphere of the national economy, ecological knowledge and skills are of a universal nature, they are necessary for everyone, regardless of their specialty.

One of the controversial and controversial issues when it comes to ecology is the problem of methodical organization of environmental education. There are two main trends in this regard. Some experts believe that it is necessary to develop the science of "ecology", which should be included in the content of different levels of education, because it must be included in the content

of education at different levels, because environmental education is closely related to biological education. however, the two studies are not equivalent.

Others argue that “greening” all academic subjects is more effective because environmental issues are global, interdisciplinary in nature. Currently, this approach is gaining more and more support, which is reflected in the materials of the relevant international conference.

But the debate about the orientation of environmental education is even more important. The main issue is what should be the focus: “natural environment” (“environment”) or “natural world”.

In the first case, ecological education includes, firstly, the system of ideas about the natural world as a set of unique natural objects (and their complexes), and secondly, a subjectively significant attitude to natural objects as a unique ; identity and internal possibility, and thirdly, it should be directed to the formation of strategies and technologies of non-pragmatic interaction with them.

The first direction of environmental education ("nature as environment") received the greatest development in the world and support at the international level. However, in recent years, more and more experts have realized that it is impossible to solve the problem of the ecological crisis without focusing on the “world of nature” in environmental education: *"We will never be like trees, birds, grass, beetles we cannot "jump" over seemingly ordinary things. We must bring young teenagers into this world and teach them the culture of dealing with flora and fauna.*

In this regard, the importance of biological science in environmental education is determined, first of all, by the content of scientific knowledge about living systems at various levels. Particular attention is paid to the organizational level of the organism: population, biocenosis, biogeocenosis, biosphere. The multi-level nature of the organization of a living organism is revealed: each level is a system, and its properties cannot be reduced to the properties of its constituent elements. It is only at the level of the biosphere that the global biotic cycle of substances takes place, which is in principle impossible at the level of lower-level ecosystems, which requires the protection of the integrity of the biosphere and all its subsystems.

Basic ecological concepts: “environment”, “ecological factors” (abiotic, biotic, anthropogenic) are introduced in the biology course.

In biology classes, students come to the conclusion that the richness of relationships between species is a condition for the integrity of the natural world. As a result of human intervention, the reduction in the number of these connections threatens the normal functioning of the ecosystem.

In the biology course, school students are focused on values. The importance of the natural world in the life of every person and the whole society is demonstrated, and an understanding of the goals and consequences of interactions with nature is formed.

It is of particular importance to understand anthropogenic factors as the factors that caused the global environmental crisis. At the same time, it is necessary to pay attention not only to man-made nature, but also to personal nature, for example, the impact of a person in the conditions of recreation.

Biological sciences take a leading place in revealing the scientific foundations of environmental protection, in particular, the principle of comprehensive protection of nature. Botany, zoology and general biology courses provide an understanding of protected areas: history

of protected areas, status of various protected natural areas, their geography, functions, bi-spheric importance, development prospects, etc.

In the teaching of chemistry, it is necessary to pay attention to the ecological problems caused by the strong chemical influence of mankind on the biosphere.

By examining chemical elements, their compounds and describing their role in nature, students will learn about the chemical composition of water, air, and soil as abiotic factors of the environment. The concept of natural dynamic balance between the chemical indicators of various elements of the ecosystem is formed.

It is precisely the problem of pollution of nature with waste as a result of human activities, in particular, highly active chemical compounds synthesized by man that are not completely "ready" to be processed by nature, that is clearly revealed in the course of chemistry. An understanding of the use of natural and synthetic substances as fertilizers and pesticides is provided.

In chemistry classes, knowledge about the chemical nature of the circulation of substances in the biosphere is deepened, strategies for combating chemical pollution of the biosphere are shown, and an understanding of waste-free, "environmentally clean" production is given.

Modern conditions require pedagogic chemists to pay more attention to the chemical-technological components of industrial waste treatment processes, as well as to equip schoolchildren with practical skills that allow them to analyze the level of chemical contamination of food themselves (for example, determination of the amount of nitrates in fruits and vegetables, comparison with acceptable standards; analysis of drinking water, etc.).

The environmental aspect of the school physics course is mainly to convey to students the technical and technological foundations of minimal negative impact on the ecosystem.

Environmentally clean energy sources (rivers, wind, solar radiation, sea waves, geothermal sources, etc.), as well as closed production cycles, are of great importance.

In the physics course, schoolchildren can formulate environmentally oriented engineering and design strategies based on energy-saving inventions (increasing the efficiency of engines, using secondary resources, reducing raw materials and energy losses in technological processes, etc.).

Special attention should be paid to issues of protection and emergency (concrete sarcophagus and steel shells, containers for nuclear waste), as well as treatment facilities (electrical filters, inertial filters, aerosol filters, fabric filters, adsorption filters, diffusion membranes, etc.).

The accident of Chernobyl (Ukraine) and Fukushima (Japan) nuclear reactors encouraged and activated a different consideration of problems such as radiation pollution, radiation background and its permissible parameters, devices for measuring radiation levels and their individual use in the physics course.

Thus, biological sciences, first of all, form ideas about the levels of organization of life and the systematic nature of relationships in the biosphere, geography - the integrity and unity of the natural world, chemistry - pollution of the natural environment, physics - being in an energetic relationship with nature. In all scientific subjects, it is necessary to analyze the "nature-society-man" system, to show ways of harmonizing the interaction of the elements of this system.

Today, when ecological problems have become a matter of life and death, ecology must occupy a strong place in the curriculum of general secondary education. Therefore, many students who come to study at a higher educational institution today do not know even the first concepts

about ecology. This makes it difficult for students to deeply understand the complex processes and phenomena of ecology, and has a negative effect on their growing up as a perfect person with an ecological culture.

So, the introduction of elements of ecology into the educational process of physics, on the one hand, helps to strengthen the ideological-political, worldview content aspects of the lesson, and on the other hand, in order to conduct it more effectively, its polytechnic, school students helps to increase labor orientation in order to effectively prepare them for various sectors of the economy. Because the preparation of schoolchildren to participate in any sphere of the national economy, environmental knowledge and skills are universal, they are necessary for everyone, regardless of their specialty.

Studying the physical aspects of environmental knowledge leads to the deepening and expansion of students' knowledge of physics, increasing their interest in science, forming a series of conservation skills in them, convincing them that environmental knowledge and skills are vital, forms a scientific vision of the integrity of nature in their minds, helps to understand the role and place of man in it, the protection and rational use of natural resources, and the current and future tasks that mankind must solve in their reproduction.

In order for these potential possibilities of environmental education and education to become real in the course of studying physics, the teacher should enter the educational process with the idea of “greening” and understand its necessity today. After all, the survival of humanity now depends on the maintenance of a general ecological situation favorable for life on Earth, which, as we mentioned above, not only by nuclear weapons, but also by any source that causes a strong irreversible disturbance of the natural balance.

To understand this and convey environmental information to students, to develop their “ecological consciousness”, to involve schoolchildren in the preservation of nature, its beauty and wealth, to make them anticipate possible changes in the balance of the environment. Educating in the spirit of the need for research and assessment, the influence of their future production activities in the conditions of the acceleration of scientific and technical development is the direct civic duty of a physics teacher and a great contribution to the struggle for normal living conditions on our planet. Today's high school students should be encouraged to keep them.

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