

Ecological and Technological Education of school children as a System of Interdisciplinary Educational Environment in the Yamal-Nenets Autonomous Okrug, Russia

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Annotation

The role of the school subject «Technology» in environmental and moral education as a synthesis of integration and convergence of environmental and technological education is considered.

Keywords

System-activity approach, complex and systemic understanding of the world around, interdisciplinary educational environment, interdisciplinary communications, environmental and technological integration, sustainable development concepts, project activities.

My leading idea has been and still is the environmental and moral education of schoolchildren and the creation of conditions for the implementation of a combination of nature-friendly, environmental and health-saving technologies. In my experience, the pedagogical model of ecological education of students was designed under the guidance of Professor Yu.L. Khotuntsev on the basis of the system-activity approach, which is successfully implemented in the technological education of the Yamalo-Nenets Autonomous Okrug.

The formation of elements of ecological culture within the subject area «Technology» occurs in the process of selecting and manufacturing objects of labour. These include such objects that carry not only material (satisfaction of human needs), but, above all, moral and ethical value. For example, objects that minimize the destruction of the environment, limit the negative impact on it and contribute to the moral satisfaction of a person [1, 6].

In modern conditions, education is considered as a way of cognizing the surrounding world by an individual. Consequently, in the learning process, each student must form a complex and systematic view of the world around him.

An important role in this is played by the integration of ecology and technology, which

- as a learning goal, must give the student the knowledge that reflects the connectedness of individual parts of the world as a system, teach the child from the first steps of learning to imagine the world as a whole, in which all elements are interconnected;

- as a means of teaching, aimed at mastering promising and safe ways of life, developing erudition and cognitive motivation of the student, ensuring the implementation of intersubject connections as opposed to the existing narrow subject specialization in teaching. For example, the module «Industrial technologies» considers general environmental problems associated with respect for nature, saving materials and energy, combating pollution and waste recycling, as elements of social ecology, and health-saving technologies as an element of human ecology are associated with protecting human health in performing technological operations [7].

It should be noted that the ecological content of technological education (its interdisciplinary essence) is revealed on the example of the manufacture of social, ecological and environmentally compatible objects of labour in technology lessons in the process of project activities and an attempt is made to increase the level of ecological culture and ecological responsibility of the younger generation, which contributes to the implementation of the concept of sustainable development in general, and also meets the requirements of the federal state educational standard.

Within the subject area «Technology», requirements for environmental education have been formed using the project method, which is focused on the age and individual characteristics of personal development and environmental education of students and is aimed at ensuring continuity in environmental education of schoolchildren from younger to older age. So, for example, with the participation of schoolchildren in the All-Russian Olympiad for schoolchildren, the criteria for evaluating creative projects include a double environmental assessment of both the future product with the technology of its manufacture, and the assessment of the finished product, which indicates the importance of this integration [3].

In the learning process, the scientific foundations of the technology for processing structural materials are implemented, including natural phenomena and the technological foundations of the manufacture of products, the basic laws of production are highlighted and generalized, on the basis of which the principles of operation and the device (in general form) of the most important for the production of machines, installations and devices are explained, necessary and important for domestic and social work, and their relationship with the ecosystem. As a result, the environmental consequences of the use of technology and human activities in the national economy, their impact on the environment and human health are revealed, and the thoughtfulness of solving environmental issues is explained and justified.

Basic and additional education connect the lesson and extracurricular activities of schoolchildren and provide a single educational space, where the core of such integration is the project and research activity of children, which ensures their independent activity of an ecological and technological orientation, the encouragement and development of which determines great developmental opportunities.

These judgments are confirmed in practice. Thus, the results of ecological and technological integration are determined by the coefficient of participation of schoolchildren in various Olympiads and competitive events. However, their examination and analysis show that only in isolated projects of schoolchildren were intersubject connections realized. This indicates that only a few students clearly explained and indicated in the explanatory note what knowledge and in what subjects they used. Therefore, it is worth considering how to more effectively use the design capabilities as the main means of integrating technology with other subjects [5].

Many projects are of an abstract nature, without novelty and analysis with previous analogs. Today's schoolchildren find on the Internet and copy a huge amount of information, but most of them fail to carry out a specific in-depth analysis, select the most essential material and systematize it, although in the light of the Federal State Educational Standard it becomes clear that it is project activity that forms universal educational actions.

At the same time, the work of students in the development and implementation of environmental and technological projects, using the model of the methodology for the formation of elements of environmental culture in the subject area «Technology» [2], tested in individual schools of the Yamal-Nenets Autonomous Okrug, showed a deeper integration of subject areas: «Ecology» and «Technology».

For example, a creative project of a ninth-grader from the city of Noyabrsk «Exterior of a school ski base» was exhibited in the nominations: «Nature protection and rational use of natural resources», «Technological development» of the international ecological competition of scientific and experimental research and applied developments of schoolchildren «BIOTOP-16». The aim of the project was to decorate the facade of the school ski lodge (Photo 1.) with decorative elements using recycled materials.

Broken coloured glass served as the main material for the exterior. Almost the entire school is engaged in the preparation of this material. These are mainly bottles and jars of white, brown, blue, green colours, as well as coloured dishes, vases, bottles used in perfumery, and other glass products that are not suitable for their intended use. During regular subbotniks for cleaning the territory of the microdistrict, all glass containers are packed in separate packages, which were brought to the school workshop for further use by students in practical work [4].

The project of a ninth-grader from the city of Salekhard «A swimming vessel for collecting rotting plankton in polluted water bodies of Russia» was exhibited in the nominations: «Nature protection and rational use of natural resources», «Technological development» of the international competition of scientific and experimental research and applied developments of schoolchildren in the field of ecology «BIOTOP-17». As part of the design, the goal setting of this project led to the manufacture of a model of a floating vessel for cleaning rivers from rotting plankton and other waste along the way. The project is aimed at minimizing the pollution of rivers and lakes using the example of the Volga river system, where shallow areas of the floodplain are flooded tens of kilometers from the fairway with the formation of islands and bays. As a result, in summer, the shallow water warms up quickly and a very large amount of blue-green algae is formed, and even the current of the fairway is not able to cope with such an amount of biomass formed [4].



Photo 1. Panel «Skier» (From the archive of V.P. Sosnov)

In the modern educational situation, such pedagogical technologies are in demand that make it possible to provide a personality-oriented nature of education, implemented on the principles of interdisciplinary integration, competence-based and system-activity approaches. Convergent education is aimed at achieving effective educational results, which allows students not only to make an informed choice of future professional activities, but also to ensure the achievement of modern results that allow school graduates to be successful and in demand in an independent adult life. The word convergence (from Lat. *Convergo* – «bringing closer») means the process of convergence, convergence (in a different sense), the fusion of all that is different, dissimilar in one way or another. This word has become popular in education as well.

Thus, convergent learning is a project aimed at creating such an interdisciplinary educational environment, both in the classroom and in extracurricular activities, in which students will perceive the world as a whole, and not as a school study of individual disciplines.

Currently, environmental education in the light of the concept of sustainable development acquires the status of both an integrating and a convergent factor of education as a whole, determines its strategic goal and leading directions. The general educational goals of environmental education are associated with the definition of spiritual, theoretical and cognitive prerequisites and conditions for solving an environmental problem. Today, environmental education in comparison with environmental protection has become a qualitatively new stage in the development of education, requiring the introduction of new fundamental concepts and knowledge into the educational process on the basis of an interdisciplinary educational environment.

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