

INTEGRATION OF SCIENCE EDUCATION CONTENT

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ABSTRACT

The didactic possibilities of studying the elementary fundamentals of biophysical science by high school students of secondary schools are considered.

Keywords. Integration, Biology, physics, biophysics, synergetic approach in science.

For a long time, the content of education was determined by social orders, requirements for the formation of a well-rounded personality: the personality was considered as an object of influence. The orientation of the educational system to the needs of the individual, taking into account the life experience, opportunities and abilities of students poses the task of improving the content of education in general education institutions, taking into account the individual characteristics of personal development, the patterns of formation of scientific knowledge systems, the development of scientific and technological progress, and the social order of society. Reforming the content of education is also associated with profile and level differentiation, which is implemented in school on the basis of free choice of the direction of education, profile of training, and self-determination of the individual in the study of elective subjects. All this determines the variety of possible options for educational content models and the creation of various types of general education institutions.

The lyceum as a type of general education institution provides the general mental development of the individual, but unlike other institutions, it contributes to the formation of cognitive activity, which sets the profile of the individual's development. On the basis of general education training, through the assimilation of subject content, a student at the lyceum, in addition to the standard of education, receives specialized knowledge, skills and abilities aimed at higher educational institutions. The student's cognitive profile develops and is formed under the conditions of profiling the content of education. Content support for lyceum education goes along the lines of constructing specialized knowledge, forming a structure of cognitive activity adequate to the activity of a specialist, and developing personality traits that correspond to certain educational profiles. The type of institution under consideration cannot be created without developing a model of specialized education, defining subject content, and the logic of interaction between general, additional and specialized education of students. Scientific profiling

of the content of education is a consequence of differential processes in education, which at the private scientific level act as factors in the development of integration processes in the content of natural science education.

Natural science in the modern understanding is a set of sciences about nature as a system of bodies, “material realities” that are interconnected, interacting, and moving. The educational field "Natural Science" is an invariant element of the educational content of any general education institution. It is considered in the curriculum as an independent form of representing cultural consciousness, expressing the integrity of natural science knowledge. Natural science is called upon to form a general scientific culture, the natural-scientific worldview of schoolchildren, their views, ideological beliefs, and morals. These tasks are solved in various educational institutions, focused on the cognitive needs and capabilities of the individual on the basis of profile and level differentiation, implemented through the freedom of choice by students of the school profile, class, as well as the study of elective subjects. The alternative nature of natural science education poses the task of developing the content of natural science education, on the one hand, corresponding to the level of general cultural development of social relations regulated in the state education standard, and on the other hand, satisfying the needs of students, taking into account their cognitive capabilities and scientific orientation.

Recently, there has been a general tendency to reduce the hours for studying natural science subjects in the curriculum, which gives rise to a number of problems. The facts of such manifestations are a decrease in qualitative and quantitative indicators of student performance in natural science subjects in schools, students’ interest in studying natural science subjects is catastrophically declining, and as a result, in order to enter a university and pass exams in natural science subjects, additional classes and tutoring are required. The proposed approaches to updating the content of natural science education, focused on copying foreign experience and discarding the developments of domestic didactics and methodology, lead to negative manifestations in education and actualize the search for approaches and forms of presenting the content of natural science education in school.

Attempts to develop models of lyceum science education are widely practiced. However, due to insufficient theoretical development, such attempts are predominantly empirical in nature and, accordingly, face significant difficulties.

The determining source of integration of educational content in the lyceum is the integrity of natural science, as an open system of scientific knowledge about nature, presented in the form of physical, chemical and biological content. From these positions, the factors of formation of the content of natural science education have been studied, the leading among which are the

individual properties of a person, his capabilities and orientation.

The integrity of the content of natural science education, both physical, chemical and biological, is determined by the integrative interaction of basic, additional and specialized education at the lyceum. Physics is the basis that determines the interaction under consideration and ensures an increase in the level of fundamental knowledge.

The content of lyceum natural science education in modern conditions involves the implementation of the following teaching principles:

- scientific character, revealing the objectivity and integrity of the content of the system of natural science knowledge, including scientific facts, methods of knowledge, concepts, laws, theories, picture of the world;

- fundamentality, manifested in the priority of theoretical knowledge over applied, methodological over factual, substantive over integrated;

- orientation that determines the conditions for the study of natural science knowledge (physico-mathematical, physico-chemical, chemical-biological, biophysical), defining the profile of education taking into account the needs of the individual;

- systematicity, revealing the integrity, orderliness, interconnection of elements of natural science knowledge, determining the structure and sequence of the study of natural science subjects, the direction of development of natural science knowledge;

- individuality, which provides for the organization and implementation of natural science educational trajectories of the individual, taking into account its orientation and capabilities;

- continuity, ensuring a continuous process of transition of students from one natural science educational system to another, with a higher level of education;

- activity that provides knowledge of natural science knowledge at the level of search, research, creative activity in conditions of self-realization and self-development of the individual;

- technological effectiveness, revealing the main ways and methods of implementing natural science education at the lyceum, taking into account the peculiarities of students' perception of natural science content.

The integrity of natural science in the system of scientific knowledge was the methodological basis for the integration of the content of natural science education in the lyceum, a condition that ensures that the development of scientific and technological progress is reflected in the content. The humanistic orientation of the content of natural science education made it possible to reveal the internal needs of the individual, take into account his cognitive capabilities and orientation. These foundations determine the essence of the integrative-personal

approach in the formation of the content of natural science education, which is implemented through:

- integrity, orderliness, interconnection, interdependence of the content of education, taking into account the cognitive capabilities and orientation of the individual;
- individualization, personalization and specialization of educational content, taking into account the interest and predisposition of the individual to study physics, chemistry and biology;
- the relationship between the basic, additional and specialized content of natural science education in conditions of personal self-determination;
- interaction of practical, educational, cognitive, research and creative activities in conditions of personal self-expression;
- the relationship between training, education and personal development through the integration of the content of natural science education;
- development of students' natural scientific thinking in conditions of priority of theoretical knowledge over empirical knowledge;
- orderliness of the relationship between fundamental and applied training of students in the direction of fundamentalization of natural science knowledge and their orientation towards the applied profile of university education;
- the relationship between the content and procedural aspects of the educational process in the direction of developing the intellectual potential of the individual.

Within the framework of the selected approach, the integration of the content of natural science education is considered as a theoretical basis for the relationship, interdependence, ordering of the structural elements of education and performs methodological, differentiating, systematizing, environmental, polytechnic, developmental, directional, humanization, continuity and updating functions of the content of education. The fundamentals of the theory of integration of the content of natural science education are presented in the content, formalized and activity aspects.

The problem of integrating the physical, chemical and biological content of education in the lyceum requires further research in the direction of increasing the level of integrity of education, as well as the development of developing educational technologies in the lyceum. In addition, it is important to explore the possibilities of using a theoretical approach to content integration to model educational processes in other types of institutions.

Based on pedagogical research, the following conclusions can be drawn:

1. The current state of pedagogical science allows us to identify the main options for organizing the content of natural science education: comprehensive, integrated and subject-

specific. In the conditions of lyceum education, the content of natural science education is implemented on the basis of an integrative-personal approach.

2. The main source of integration of the content of physical, chemical and biological education in the lyceum can be natural science, as a system of scientific knowledge about nature, in which natural science knowledge begins to be studied from physics.

3. The content of lyceum natural science education is characterized by the integrity of basic, additional and specialized education, based on the didactic principles of scientificity, fundamentality, focus, consistency, individuality, continuity, activity, technological effectiveness.

4. The theoretical foundations for the integration of the content of natural science education are presented in the form of certain functions, content, formalized and activity-based aspects; they make it possible to describe practical models of the content of education.

5. The integration of the content of natural science education of a biological species at the level of didactic synthesis in the lyceum is implemented through generalization of the object of integration in the curriculum, highlighting subject lines of natural science education, teaching synthesized, core, complex, integrative and generalizing educational subjects, forming a structure of cognitive activity focused on search, research and creative nature.

6. An experimental study of the integration of content at the level of didactic synthesis in a lyceum, using a practical model, teaching a synthesized academic subject of biophysics, the formation of student research activities, the organization of individual cognitive activity, ensures an increase in quality indicators of the formation of knowledge and skills, the development of theoretical thinking, and shapes the direction of behavior personality.

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