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THE ROLE AND EFFECTIVENESS OF INTERDISCIPLINARY INTEGRATION IN NATURAL SCIENCE TEACHING

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Abstract: This article discusses the importance of interdisciplinary integration in teaching natural sciences as one of the important principles of modern education. Since physics, biology, and geography serve as the basis for explaining the sciences, the close connection between these disciplines increases the effectiveness of the learning process.

Key words: Interdisciplinary integration, innovative education, project-based learning, critical thinking, creative approach, practical problem solving.

The implementation of innovative approaches and technologies is of vital importance in the modern education system. In the 21st century, technological progress, scientific advancement, and the emergence of new professions necessitate a fundamental transformation of the educational process. Against this backdrop, interdisciplinary integration and STEAM technologies are emerging as key tools for enhancing the educational process.

Interdisciplinary integration focuses on applying students' knowledge to real-life situations by strengthening connections between disciplines. This develops problem-solving skills that integrate different disciplines, rather than within a single discipline.

In a rapidly changing world, a person is required not only to have knowledge, but, first of all, to thoroughly understand this knowledge, to gain practical experience and work on projects, and to think independently and creatively. Not only adults, but also preschool children are actively using any technological innovations. Every child is a potential inventor. From an early age, children are interested in motorized and moving toys, robotics, building and construction materials, experiments with animate and inanimate nature, they try to understand how they are made and how they work by breaking their toys, that is, why the wheels turn, the lights turn on, and make sounds. Properly organized technical creativity of children allows them to satisfy this interest and involve the younger generation in useful practical activities. Due to the fact that students have different ways of learning and mastering, teachers have to choose teaching methods taking into account the specific strengths and weaknesses of each student. These concepts have influenced the areas of learning by encouraging a holistic approach to education. Areas of learning are important in the processing of information and the development of students' skills.

The teacher U. Musayev offers the following different levels of integration. Integration based on the sequential presentation of topics; in this case, the principle of concentricity is followed in the presentation of educational materials, that is, the previous educational material complements the next. Integration is not a mechanical combination of disciplines, it is a synthesis, the emergence of something new, a discovery. It is the convergence, connection of separate systems and the creation of a single new thing. Integration is the opposite of differentiation, a process that is opposite to it. It is expedient to apply it in the following areas: a) integrated study of content within subjects and disciplines; b) integration of the activities of individuals teaching different subjects; c) integration of forms of organization of educational work or the school day.

Researcher B.S. Abdullayeva also divides interdisciplinary connections into the following types:

1) substantive;
2) operational;
3) methodological;
4) organizational.

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As B. Abdullayeva noted, skills and competencies form the educational process through thinking operations. Integration is consistent with the following ideas of Farididdin Attor: there is no such thing as a small thing in this world, everything is interconnected and complements each other. The lesson should not only be educational, but also be aimed at educating students in the humanistic aspects. Based on the content of the subject, scientific knowledge about nature, society, human thought, development, education should be aimed at forming confidence and faith in the future of our republic. In general, the integration lesson should be consistent (thematically) and based on a thorough plan.

The essence of the integrated approach is that integrated lessons encourage students to study a topic from the perspective of many disciplines. For example, integration between biology and chemistry helps students to understand metabolism or cellular processes more deeply. From a pedagogical point of view, the main goal of integrated lessons is to develop students' logical, analytical thinking, understanding of interdisciplinary connections, and the application of skills to real-life situations. Many intellectual approaches show that integrated lessons in the educational process are based on the theory of multiple intellectual approaches, that is, they help develop various intellectual abilities (mathematics, language, art, etc.). The practical significance of the integrated approach is project-based learning, the development of interdisciplinary skills, research skills, and the use of innovative technologies.

This approach helps prepare students for the skills needed for modern careers in the future. Integrated lessons aim not only to teach science, but also to develop practical life skills.

The main principle of the integrative approach to organizing project work in natural sciences is aimed at developing students' skills by connecting multidisciplinary knowledge. This approach includes problem-based learning, a practical approach, teamwork, the use of new technologies, and the development of critical and analytical thinking.

In the modern education system, the organization of the educational process in a certain coherence and logical interconnection of the content and goals of general educational subjects, as well as improving the quality and efficiency of education, serves to broaden the worldview of young students and enrich their world of thought with vivid images. The possibilities of intersubject communication are also unlimited in optimizing the content and scope of education, enriching the educational process with modern pedagogical technologies and information and communication technologies, and embodying the content of education in the minds and thinking of young students through life images.

Organizing physics and astronomy lessons within each subject in a way that is interconnected and connected with other disciplines ensures the meaningfulness of the learning process. The expansion of the scope of information, the increase in the amount of knowledge and skills that students need to know, requires the development of optimal options for integration processes. Organizing, managing and directing such comprehensive processes, of course, requires constant work on oneself and intellectual potential from the teacher. Integration in teaching natural sciences serves to strengthen the structural connection with related and other disciplines, generalize them, and further enrich students' holistic ideas about nature and society. This process depends on the effective use of methods and tools by the teacher.

Introducing foreign experiences into the educational process improves students' skills in working with technology, ensures their competitiveness, and creates a solid foundation for future scientific activity.

Implementing a number of activities, such as teaching the content of new educational and methodological complexes and the necessary connections, taking into account the age and psychological characteristics of students in the study of natural sciences in an interconnected manner, guarantees effective results in this regard.

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