

INTEGRATION PROCESSES IN THE TEACHING OF NATURAL SCIENCES

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SUMMARY

The paper analyzes the integration processes in the teaching of natural sciences, from primary school to the students of higher educational institutions. It is shown that the integration that occurs along with the processes of differentiation, aimed at strengthening the links between objects. Teaching of natural sciences is conducted in such a way that the studied courses are not consistent with each other, often have different interpretations of the same phenomena of nature do not form a unified approach to the study of natural sciences. In higher education, the integration of biological profile observed in virtually all disciplines studied, especially in the senior years. The integration process can be traced at all levels of education, from primary school to senior teaching in universities.

Keywords: integration education, primary school, higher education, sciences education, methods of teaching.

SCIENCES EDUCATION IN GENERAL SCHOOL SYSTEM

Science education – one of the components of the younger generation to independent living. Implementation of this problem is possible through elementary school subjects: “Knowledge of the world” (grades 1–4), middle school “Natural Science” (Class 5), geography, biology, chemistry, physics, astronomy (6–11 classes) integrated course “Natural” (Grade 11). Integration of subjects is also continuing in the disciplines of natural - scientific profile of the higher school (Fedoretc, 1990, p. 98). Integration process (from Lat. Integration – compound recovery) is an amalgamation into one previously disparate parts and elements of the system based on their interdependence and complementarily. The integration process is a higher form of embodiment of interdisciplinary relations to a qualitatively new stage of education (Nazarov, p. 262).

Integration process in the education system begins in elementary school with the subject “Knowledge of the world” (1–4 classes). Knowledge objects is man himself in relationship with nature and society. The aim of the integration

of primary school is laying the foundations of a holistic view of nature and society, attitudes to the laws of their development. Integration that occurs along with the processes of differentiation, aimed at deepening ties between the objects. Need to teach children to see the interconnectedness of all that exists in nature and in everyday life. Implementation of the integration process in elementary school is more easily accomplished because the learning process involved one teacher. Primary school teacher can conduct lessons on integrated knowledge of the world, which are clearly traceable relationship such natural sciences as physics, astronomy, biology, chemistry, ecology, geography. In the course of “Natural” comes deepening occupation and knowledge gained in the classroom to students’ “Knowledge of the world” (1–4 classes). And in this case there is the integration of the natural sciences by one teacher. Integrated lessons promote the formation of a coherent picture of the world of children, understanding of the links between the phenomena in nature, society and the world at large. Use of information and computer technology to solve problems in various fields, helping perception holistic picture of the world.

From the 6th grade, there is a division, previously integrated into a single object of Sciences. There are separate disciplines: biology, geography. In 7th grade, in addition to these subjects, added physics, in the 8th grade – chemistry. To optimize the learning process in schools organized scientific – methodical work within academic departments on subject areas. Each unit provides for the introduction of the integrated course designed to synthesize knowledge of the subjects received training block. The proportion of generalized knowledge, capable of forming students’ holistic picture of the world. To date, there is the problem of teaching natural science subjects, which translates into inconsistency items unproductive duplication of topics in different courses and, as a consequence, in the absence of integrity knowledge overload teachers and students. Easy transfers of knowledge on these subjects not bring the desired result. Need to teach students to relate the knowledge transfer from one area of knowledge to another, use the knowledge for self-development, self-learning, self-improvement. The idea itself is not new, the problem is, on what basis, what principles should be carried out this integration. The problem of integrating relevant and productive new social demands imposed on the school, and due to changes in the field of science and industry. Modern education system aimed at creating a highly educated, intellectually developed person with a consistent view of the world picture, understanding the depth of connection between the phenomena and processes.

Integration is possible only if the relatives of sciences, corresponding inferable subjects; identity or similarity of the object of study, the presence of common methods and theoretical concepts of construction (*Education...*, p. 125).

INTEGRATION IN SUBJECTS EDUCATION

For example, such objects in the natural sciences were: the phenomenon, process, interaction, substance, system, medium body. All these objects of knowledge are studied in chemistry and biology, physics, geography, etc. After working on the definition of semantic objects, found common ground and differences in the understanding of each of them in the context of each item separately. For example, the general conception of the object in the process in any context refers to its general philosophical meaning: progress, development of any – any phenomenon, a succession of state in the development of something. In the study of chemistry processes (Nugumanov, p. 17) occurring in atoms, chemical reactions, similar processes are studied in physics (nuclear reactions, electrolysis, diffusion), in biology (biochemical processes of metabolism, respiration, photosynthesis) in balneology effects (chemicals and physical effects on the human body). Concept of substance – qualitative essence of matter is also seen in all areas of science: chemistry (Me, Nemea, transition elements and their compounds, the major classes of organic and inorganic substances), physics (Me, gaseous substances, water, solutions of various compounds, radioactive elements), biology (chemical composition of plant and animal cells, the composition of bone, muscle, nerve tissue, amino acids, proteins, carbohydrates, fats, lipids, nucleic acids, etc.), geography (water, minerals, oil and gas) IT etc. Such examples showing similarities objects of knowledge in the natural sciences proved enough.

Subject disunity becomes one of the causes of fragmentation outlook graduate school, while in the modern world dominated by trends in economic, political, cultural, information integration. Independence of objects, their weak link with each other generate serious difficulties in forming a complete picture of the world students, impede perception to organic culture (Puzankova, p. 85). One of the direction of modernization of the education system in the school is the introduction of computer technology and multimedia, training competent PC user. Literacy is defined by the quality of the user owning application packages. However, knowledge of the capabilities of such packages as Microsoft Office (Word,

Excel, Access, PowerPoint), as well as other custom packages is not enough. After all, they are only a tool for which you want a specific application. This leads to the need to integrate the subject of computer science at the school with other school subjects, with their natural association (ibid). Geography, chemistry, biology now have not only natural – scientific in nature, they do not just give a natural scientific knowledge, and contribute to the education of an educated person.

METHODS OF TEACHING

Traditional methods of teaching these disciplines in modern conditions must undergo renewal, one of the ways that the integration of the teaching of science, including the use of modern information technology (Fedoretz, 1991, p. 22). Usually in school teaching of natural sciences is conducted in such a way that the studied courses are not consistent with each other, often have different interpretations of the same phenomena of nature do not form a unified approach to the study of natural sciences. However, these sciences are inseparable, since studying virtually the same natural phenomenon and teachers will have to form a holistic view of children about the world, about the interconnection of natural processes and phenomena.

Need to teach children to observe and describe objects and phenomena of the real world, while noting the physical, chemical properties of these objects, tracing biological role of processes and considering the spatial and temporal characteristics (such as geographical conditions and the role of the studied objects in the universe from the standpoint of science of astronomy). Implementation of integration allows you to organize and synthesize knowledge and skills and to promote the integrated application, synthesis and reinforce ideological orientation, to form a comprehensive development of the personality in the field of natural sciences; optimize and intensify training and teaching activities (Talyzina, p. 218).

In higher education, the integration of biological profile observed in virtually all disciplines studied, especially in the senior years. For example, in the course of study on biological chemistry and physiology of plants is carried out integration with other disciplines. For example, the study of biochemistry closely related to organic chemistry, physics, biophysics, molecular biology, genetics, plant physiology – with biochemistry, botany, cytology, histology, biophysics and other sciences. Especially strong interdisciplinary communication can be

traced in the course of plant physiology and biochemistry. These courses can not be separated and read separately. Differentiated reading biochemistry and physiology of plants as separate subjects, constantly being the integration of these disciplines. For example, sections are included in biochemistry course in physiology of plants: photosynthesis (plant physiology) = synthesis of carbohydrates (biochemistry), respiration (plant physiology) = decay carbohydrate (biochemistry), etc. Thus, the integration process can be traced at all levels of education, from primary school to senior teaching in universities.

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INTEGRACIJOS PROCESAS MOKANTIS GAMTOS MOKSLŲ

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Santrauka

Straipsnyje atskleidžiama integracijos svarba mokant gamtos mokslų. Mokymo proceso integracija apžvelgiama keturiais lygmenimis: pradinėse, pagrindinėse ir vidurinėse mokyklose bei atskirai analizuojama aukštosiose mokyklose. Aptariamas kiekvieno lygmens integracijos laipsnis ir atskirų gamtos mokslų sintezės ugdomoji svarba. Išryškintos problemos, su kuriomis susiduriama, jeigu yra silpna gamtos mokslų integracija. Nurodomos mokslo šakos, į kurias išsiskaido ir yra integruojami gamtos mokslai, įvardijami taikomi ugdymo metodai.

Reikšminiai žodžiai: integruotas mokymas, gamtos mokslai, pradinė mokykla, aukštasis mokslas, mokymo metodai.