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THE RELATIONSHIP BETWEEN PHYSICS AND BIOLOGY IN THE STUDY OF THERMODYNAMIC SYSTEMS

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Annotation

The didactic possibilities of teaching physics in connection with biology by high school students of secondary schools on the elementary fundamentals of biophysical science are considered.

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

At the present stage of development of Russian education, the urgent problem is to improve the quality of education, which would satisfy the cognitive needs of students, ensure a high level of their fundamental training, personality development and its adaptation in rapidly changing socio-economic and technological conditions. The orientation of the modern education system towards the needs of the individual, taking into account the abilities and capabilities of students, and the profile orientation of the content of education poses the task of improving the quality of specialized natural science education.

As part of the implementation of state priorities for the modernization of education, the pedagogical community faced the problem of choosing a specialized education strategy that most fully reflected the requirements of the state and society for the quality of education in the following areas: 1) ensuring a high level of fundamental training for students; 2) development of students' personality, increasing motivation for learning and purposeful cognitive activity; 3) preparing students for subsequent vocational education and successful continuation of studies in educational institutions of vocational education and for further professional activities.

In solving problems of the integrity of the content of natural science education and the development of natural scientific thinking, a significant role is played by the study of elements of border sciences, in particular issues of biophysics, in the secondary school physics course.

The integration of physics and biology when teaching physics allows us to reveal a generalized methodology of cognition. Since physics studies the simplest forms of

movement of matter, and biology studies the most complex, the integration of these two areas of knowledge will allow students to fully understand the ascent from the abstract to the concrete, teach them to analyze living systems and see how new integrative qualities appear in them when combined (synthesis) of simple forms of movement.

It should also be noted that the integration of physical and biological knowledge in the educational process acts not only as a set of specific educational results, the development of a holistic view of nature, but also as a propaedeutic system for further study of the biophysics course in natural science universities.

The high school physics course combines the foundations of an entire system of sciences (mechanics, thermodynamics, optics, electrodynamics, etc.), allowing the integration of physical and biological knowledge. Thermodynamics occupies a special place, since it studies the general laws of exchange and transformation of energy, applied to processes occurring both in inanimate nature and in living systems (for example, metabolism). However, in a school physics course, the application of the laws of thermodynamics is limited to a heat engine, which significantly narrows the ideological potential of this section. When studying thermodynamic systems, the integration of physical and biological knowledge will allow us to reach a new level of knowledge and reveal new possibilities for their description based on self-organization and autostabilization in a living organism.

According to modern requirements, specialized training of students should be focused on improving existing and acquiring new experience of cognitive activity, professional self-determination of students and is significant for continuing education ... and successful socialization [152] based on individualization and professional orientation of the content of secondary general education [153] . One of the ways to solve the stated requirements of the state and society for the preparation of graduates of specialized classes is the development of an individual educational trajectory of the student

Thus, there is a need to implement an integrative approach when studying subjects in the subject area “Natural Sciences” and the possibility of its implementation through a set of educational modules. The content of the modules is based both on the integration of natural science knowledge and on the knowledge gained from studying related subject areas. A set of training modules determines the structure and content of a single elective course of a meta-subject nature. One of these

modules could be the integrative educational module "Thermodynamics of Biological Systems", which, on the one hand, will take into account the individual needs of students with a certain style of thinking, showing abilities in natural science, on the other hand, it will be aimed at achieving meta-subject results, developing natural science thinking and professionally significant characteristics necessary for students to make a conscious choice of life strategy and further continue their education.

Based on the above, it can be stated that pedagogical science has accumulated experience in building an integral system of content for natural science education. However, natural science education in the context of specialized training today does not have such didactic and methodological tools, the practical implementation of which at the level of integration of physical and biological knowledge, in particular in relation to the thermodynamics of open systems, could contribute to the natural science training of students that meets the requirements society, the needs and interests of students.

Analysis of the current state of specialized natural science education in general and physical education in particular, methodological, psychological-pedagogical, scientific and methodological literature, normative documents regulating the educational process, allowed us to identify contradictions:

- between the requirements of the state and the needs of society for graduates of specialized natural science classes who have holistic natural science knowledge, developed natural scientific thinking and the real state of training of graduates of specialized classes who have subject-limited knowledge and are at the empirical-scientific stage of development of natural sciences scientific thinking;
- between the intensive pace of development of the processes of integration of physical and biological knowledge in modern science and the insufficient development of didactic mechanisms for their reflection in the content of physical education, in particular in the study of thermodynamic systems in natural science classes;
- between the potential opportunities for studying thermodynamic laws and patterns that ensure improved quality of natural science training, the development of students' natural science thinking, and the unsatisfactory state of the existing educational and methodological support for natural science classes, which does not allow these opportunities to be realized.

The need to resolve these contradictions determines the relevance of the research topic "Integration of physics and biology in the study of thermodynamic systems in natural science classes" and defines the research problem: what should be the methodology for integrating physics and biology in the study of thermodynamic systems in natural science classes under conditions.

We will consider the integration of physics and biology in the study of thermodynamic systems in natural science classes as a condition for the development of natural scientific thinking, as well as for the creation of an information educational environment capable of providing fundamental training to students through increasing the level of mastery of natural science knowledge, methods of activity and motivating students to receive specialized natural science education.

LITERATURE

1. Антонов, В. Ф. Физика и биофизика. Курс лекций для студентов медицинских вузов. [Текст] : учеб. пособие / В. Ф. Антонов, А. В. Коржуев. - М. : ГЭОТА-МЕД, 2004. - 192 с.
2. Артюхова, В. Г. Биофизика: Учебник для вузов /под ред. В.Г. Артюхова. - М.: Академический Проект; Екатеринбург: деловая книга, 2009. - 294 с
3. Балашов, М. М. О природе [Текст] : кн. для учащихся 8 кл./ М. М. Балашов. - М.: Просвещение, 1991. - 96 с.: ил.
4. Бесараб, Г. Д. Интегрированные уроки и формирование естественнонаучной грамотности учащихся [Текст] / Г. Д. Бессараб // Физика в школе. - 2000. -№ 5.-С. 17-19.
5. M.F. Atoyeva. Pedagogical Tests As An Element Of Types Of Pedagogical Technologies. The American Journal of Applied Sciences, 2(09), (TAJAS) SJIF-5.276 DOI-10.37547/tajas Volume 2 Issue 9, 19.09.2020. ISSN 2689-09. 92 The USA Journals, USA www.usajournalshub.com/index.php/tajas 164-169. Имп.5.2.
6. Mehriniso Atoyeva. The use of synergetic technologies in the study of physics course topics. Жамият ва инновациялар – Общество и инновации – Society and innovations Journal home page: ҳттпс://инссиенсе.уз/индех.пҳп/сосинов/индех. Жамият ва инновациялар – Общество и инновации – Society and innovations Issue - 2, №01 (2021) / ИССН 2181-1415 Р.
7. Буданов, В. Г. Методология синергетики в постнеклассической науке и в образовании [Текст]. - 2-е изд. М.: ЖИ, 2008. - 232 с.

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8.Загвязинский, В. И. Исследовательская деятельность педагога : учеб. пособие для студ. высш. учеб. заведений [Текст] / В. И. Загвязинский. - 2 изд., испр. - М.: Издательский центр «Академия», 2008. - 176 с.
9. Беспалько, В. П. Педагогика и прогрессивные технологии обучения [Текст] / В. П. Беспалько. - М. : Высш. шк., 1995. - 336 с.
10. Блюменфельд, Л. А. Решаемые и нерешаемые проблемы биологической физики [Текст]. - 2-е изд. - М. : Эдиториал УРСС, 2010.- 160 с.