

METHODOLOGICAL KNOWLEDGE OF THE HIGH SCHOOL PHYSICS COURSE IS A MEANS OF FORMING STUDENTS' PHYSICAL THINKING STYLE

Doctoral Obidova Zuhra
Gulistan state University (Uzbekistan)

ABSTRACT

The Article is devoted to the style of thinking of students teaching physics in secondary schools in order to form a worldview of methodological and methodological knowledge in physics students.

Keywords: Logical thinking, methodology, methodology, experiment, theory, science, theoretical methods.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

Currently, the possibilities and effectiveness of applying the historical and methodological approach in the educational process are being studied more and more actively. In the process of teaching physics, the main goal of the teacher is to form a physical style of thinking among students. Using elements of the methodology of science in the school course of physics allows you to identify new reserves for improving the process of forming a scientific worldview and style of thinking among students.

In philosophy, the "style of thinking" is understood as a system of principles of logical construction of knowledge, including methods of scientific knowledge.

The origin of the term "style of thinking" originates in one of the letters of V. Pauli to M. born written in 1952 in connection with the statistical nature of the Ψ -function. In this letter, he contrasts the Newtogue-Maxwell style. M. born summarizes the remark of V. Pauli and gives the following definition of the term "physical style of thinking": "I think that there are some General trends of thought that change very slowly and form certain philosophical periods with their characteristic ideas in all areas of human activity, including in science. Pauli used the expression "styles": thinking styles are styles not only in art, but also in science. In accepting this term, I maintain that there are styles in physical theory, and it is this circumstance that gives a kind of stability to its principles.

Being familiar with the style of your time, you can make some cautious predictions. At least you can reject ideas that are alien to the style of our time" [1]

The history of physics allows us to study problems related to the humanitarian aspect of physical science, its philosophical, cultural and other aspects. Thus, the correlation of the logical and intuitive in physics research, criteria of truth and efficiency of physical methods, etc., as a rule, never considered, although of great importance for the development of this science in the system obshechelovecheskoy values. In addition, having systematic knowledge of the history of physics, the teacher has the opportunity to correctly state the depth of the subject. Therefore, the study of the historical and methodological approach in the school course of physics is a necessary factor in the humanization and humanization of teaching this subject.

Thus, the relevance of the issue of teaching physics based on the historical and methodological approach is due to:

- the need to form a natural science worldview;
- lack of a General physics picture of the world based on modern scientific concepts;
- the role played by the history of physics in the practice and theory of educational and scientific knowledge at the present time;
- the need to identify the means and conditions for studying the history of physics and their effect on the development of students thinking when teaching natural science and physics.

The literature that was published in 70-80 bears the ideological imprint of that time and does not meet the requirements for the content of modern physical education. The scientific worldview functions of the history of physics have not been defined, and the material looks like an informational digression. When implementing the historical and methodological approach in teaching the discipline, solutions can be found for the formation of students' scientific worldview and personal development. Analysis of scientific and methodological literature allows us to conclude that the study of the history of physics is one of the main principles of scientific knowledge. At the same time, the system of teaching physics is experiencing changes, formulated in the following approaches: deductive - axiomatic, historical-inductive, and historical-methodological, whose distinctive properties are the settlement of the problem of the correlation of historical and logical in science and its implementation in the learning process. When we discover the modern role of historical facts and various functions in learning, as well as their systematic use, we believe that the question of the correlation of historical and logical material can be solved.

Using the historical and methodological approach at various stages of the lesson is possible in the form of reviews:

1. Introductory historical and methodological approach, which are a means of substantiating new knowledge.
2. The final historical and methodological approach, which is a means of communication and systematization of knowledge.

The historical and methodological approach can be presented in two forms: both introductory and generalizing. It is pointless to teach material to students in advance and review as woggy if the review is devoted to the issue on which Arsenal adolescents knowledge is very limited, and mandatory for understanding the evolution of ideas and knowledge will be rasskazyvaetsya the students during the study of the subject.

For example, at the end of the 11th grade course, the generalized material about the physical picture of the world[2] should contain information about the evolution of scientific ideas about the world. Only under this condition, the picture of the world, which modern science dictates, will appear before students as a natural result of the development of physics. It takes over all parts of absolute knowledge from the past as a process, not as something urgent and frozen. Therefore, one of the possible forms of systematization and generalization of educational material is historical images in the development of some of the leading ideas of modern physics. Generalizing the images of historical and methodological nature may be devoted to such topics as “the history of the development of the idea of close-range interaction (field)”, “history of the development of the ideas of atomism, History of the development of the idea of corpuscular-wave dualism of light”, “the history of the development of the idea of discreteness of electricity (discovery of electron), Evolution of physical picture of the world”. [3]

The main task of generalizing reviews is to show the basic stages of the evolution of views on a particular topic. At the same time, it is necessary to reveal to students the mechanism of the emergence of scientific knowledge, that is, the reasons that encourage the promotion of certain ideas, the reasons for changing some ideas by others, the difficulties that stand in the way of developing new ideas, and methods for justifying fresh views. Therefore, it is necessary not only to present the story, but to explain it, because this is what is most instructive.

In fact, the implementation of this process, the teacher must have a high methodological skill. It should clearly represent the ways of forming students' scientific worldview on the basis of the received knowledge.

In order to acquire knowledge, it is necessary to activate the students' thinking, which is the leading condition for its development. Scientific thinking is an important component of the worldview formation process. In order for the historical and logical approach to the educational process to be effective, the teacher must use the operations of thinking in the lessons:

- analysis of the studied material on the topic;
- systematization and integration of the material of each topic of the physics section around the core ideas of the physical picture of the world;
- systematization of students' knowledge based on the use of mathematical apparatus;
- systematization of knowledge, skills and abilities in the final lessons.

Students in these classes learn to rethink the particular and the concrete from the General positions of physical knowledge. Based on the above, we can distinguish the following forms of application of the history of physics in training:

1. Introductory historical and methodological overviews, which serve as means of justification of new knowledge;
2. Final historical and methodological reviews that serve as ways to justify the systematization and generalization of knowledge;
3. Descriptions of the history of individual fundamental experiments that are a means of substantiating knowledge;
4. Full biographies of scientists and fragmentary biographical information that serve to form the student's personality;
5. Experimental works that model historical and methodological experiments.

Let's consider the problem of the law of universal gravitation, the dispute about the understanding of this law, the Problem of gravitation arose in connection with the heliocentric theory of the structure of the Universe. Aristotle believed that the problem of gravity did not exist, according to his theory, celestial bodies move naturally. But Copernicus said that gravity not only exists on Earth, but also in other celestial bodies. The next step was taken by Kepler, who believed that the force of gravity between celestial bodies is inversely proportional to the distance between them. He came up with this idea based on a hypothetical analogy between the propagation of light and the propagation of gravity. The problem of gravity was studied by Hooke,. In letters to Newton in 1680, he said that the force is inversely proportional to the square of the distance between the centers. The appearance of Newton's book "Mathematical principles of natural philosophy" was a major event in scientific life. Newton first gave a mathematical "theory of the sky". Based on the law of universal gravitation, this book laid the foundations of "Differential and integral calculus". [4]

There are many types of problems in which the abilities of students with different types of thinking – specifically figurative or formal – logical-are clearly displayed." [5] this is especially facilitated by creative tasks that allow different approaches to solving on a reliable

methodological basis. Learning the basics of mathematical modeling in the study of physics involves not just the assimilation of certain rules and methods of action, but the development of a unique style of thinking, different from the one that was formed in the classical approach to the study of physics.

The quality of students' knowledge in logical thinking can be significantly improved if it is implemented through the use of knowledge in solving specific problems, while strengthening the methodological focus of teaching.

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