FORMATION IN SCHOOLCHILDREN OF THE SCIENTIFIC DIALECTIC THINKING STYLE

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ABSTRACT

In this article, vehicles reveal the essence of the formation of dialectical beliefs in students. In addition, the main features of scientific thinking are carried out in the work, where the authors of the article present an attempt to illuminate various physical phenomena by scientists of that time.

Keywords: Worldview, system, knowledge, component, dialectics, persuasion, upbringing, education, process, material, dogmatism, persuasiveness, concept, idea, conviction, truth, analysis, cognition, feeling, egoism, concept, problem.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

In addition to knowledge about nature, beliefs in their truthfulness and dialectical attitude to reality, the worldview contains one more component. Knowledge becomes conviction when it is independently comprehended, and not taken on faith “in finished form”, when they are the fruit of intense mental work. Therefore, for the formation of a worldview, it is important to teach schoolchildren the methods of mental activity, to develop their thinking, not only formally logical, but also dialectical, and to gradually accustom schoolchildren to the scientific style of thinking. All this constitutes the fourth component of the scientific worldview. A lot is said about the development of cognitive abilities of students and a lot of work has been done in this direction. Therefore, we dwell only on what features of the scientific dialectical style of thinking can be formed on the basis of studying the course of physics. Familiarization of students with the style and methods of scientific thinking is best carried out on the basis of the disclosure of the creative searches of major physicists, the influence of the creative laboratory of scientists' thoughts and their views on the cognition process [1].
Here are the main features of the style of scientific thinking.

1. Respect for facts, as the source material of any scientific statement. This idea can be explained, in particular, by the following example from the history of science. In the first quarter of the 19th century, the concept of light as longitudinal vibrations was generally recognized, since only such vibrations could propagate in ether, likened to an extremely rarefied gas or liquid. This idea was used by O. Fresnel to explain the phenomena of interference and diffraction. And only one phenomenon - the phenomenon of polarization of light - did not fit into the framework of these generally accepted ideas about light. The phenomenon of polarization required the recognition of light by transverse waves.

“This hypothesis,” said O. Fresnel, “was in such a contradiction with generally accepted ideas ... that for a long time I did not dare to accept it” (I; 246). But one cannot dismiss the fact. O. Fresnel, contrary to his sympathies, but in accordance with the requirements of factual data, introduces into physics the concept of light as transverse waves.

2. Caution in putting forward new ideas. Only the conclusion that relies not on a single fact, but on their large aggregate can be considered justified. It would seem that D. D. Thomson as early as 1897 could make a confident conclusion about the existence of an electron based on the measurement of specific charge - for cathode particles. Over the course of a number of years, he and his followers continue to put on new experiments on measuring the ratio - for carriers of the photocurrent, thermo current, for ϒ - rays, etc. And only after a good agreement between the results of all experiments, the conclusion was made about the existence of an electron.

No less instructive is the delay (for 18 years!) Of the publication by Isaac Newton of the law of gravitation, which he received back in 1665-1666, and appeared in a publication in 1686.

3. The "concreteness" of thinking, manifested in the understanding that any scientific position is true under certain conditions, and what is applied outside these conditions becomes false; understanding of variability, flexibility of concepts. This feature of dialectical thinking was clearly manifested among almost all the founders of modern physics, and above all among N. Bohr and A. Einstein, who understood better than others that some ideas of classical physics could be unfair in the micro world and the world of fast movements.

4. Healthy skepticism in relation to generally accepted, but contrary to new experimental data and, on the other hand, respectful attitude to previously obtained science. G. Galilei put forward a number of ideas that contradicted the generally accepted judgments of "common sense", the canons of "official science", the dogmas of religion.

This is the idea of the possibility of movement without the action of force, the idea of the constancy of the acceleration of gravity, the idea of the unity of "heavenly" and "earthly". For their advancement, great courage was needed, the ability to doubt the generally accepted, the freshness of the perception of the world.

5. Understanding that cognition must take into account conflicting sides in natural phenomena and consider opposites in unity. Metaphysical thinking proceeds from the fact that any phenomenon should be discussed on the principle of "either this or that": light is either particle or wave; the behavior of the electron is either accidental or necessary; the flying arrow is currently moving or resting. Dialectical thinking requires considering the phenomenon taking into account its opposite sides and their unity: light - both particles and waves at the same time; the behavior of the electron is both random and necessary; the flying arrow is currently moving and resting. Awareness of the need for such a dialectical approach to phenomena was expressed in the statement in physics of the principle of Bohr complementarity.

6. Understanding that in order to achieve truth it is necessary to take into account all the connections of this phenomenon with other phenomena. The comprehensiveness of the examination is shown by any physicist, highlighting the phenomenon under study "in its purest form." The greater the number of factors that influence the phenomenon under study will be taken into account, the more reliable the result will be. A striking example of this approach is the experiments of P.N. Lebedev for measuring light pressure.

By drawing students' attention to these and some other features inherent in the style and method of scientific thinking, we form a culture of thinking and a student's personality, and the best examples of scientific thinking presented in physics lessons will help students not only to understand science more deeply, but also to navigate correctly in life, correctly assess facts, events, social problems [2].

So, in the process of forming a scientific worldview, the following aspects can be distinguished:

a) a rigorous scientific and methodological presentation of the foundations of physics with an emphasis on the philosophical side of each issue in the course of physics;

b) a dialectical interpretation of the foundations of physics, as a result of which students are led to generalizations of a philosophical nature and to basic ideas about the physical picture of the world;

c) the formation of beliefs in the correctness of the scientific dialectical understanding of the world and the creation of a dialectical attitude to nature and the process of its cognition;

d) the development of scientific dialectical thinking, based on versatile work on the formation of cognitive abilities of students [2].

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