



THE SIGNIFICANCE OF THE PRINCIPLE OF ORGANIZATION IN TEACHING ATOMIC AND NUCLEAR STRUCTURE ON THE BASIS OF INTERDISCIPLINARY INFORMATION TECHNOLOGIES

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ABSTRACT

This article describes the importance of the integrality principle in the teaching of atomic and nuclear structure based on interdisciplinary information technologies.

INTRODUCTION

The process of qualified training of the future physics teacher requires students to imagine the scientific foundations of the physics course and the continuity and coherence in the presentation of lectures on atomic and nuclear physics in different periods of education. In the modern theory and practice of education, research is being conducted to determine the methods and methods of activating students' cognitive activities. In the improvement of this process, it is important to apply general inductive rules, in particular, the principles of continuity and coherence.

LITERATURE ANALYSIS AND METHODOLOGY

The essence of the principle of continuity is as follows: in the process of transition from one state or stage to another, some elements or parts of the general system are preserved. Consistency in the process of scientific knowledge is related to the principle of adaptation. In didactics, it is understood that the next stage is organized on the basis of previous stages. In addition, it means that school teachers organize the content of their functional activities. In this sense, continuity means that during the transition from one type of education to another, the basis (core) of physical knowledge should be preserved and developed [1-3]. It should be noted that the application of the principle of integrity requires taking into account the invariant (unchangeable) principles of the methodology along with the process of increasing students' knowledge, skills, qualifications and competence [4-5].

The principle of connection of theoretical knowledge with practical skills, skills and competences is based on the doctrine of the unity of theory and practice of knowledge. Applying this rule is one of the main tasks of physics education in secondary schools. Physical education in it, along with providing students with deep knowledge in the field of science,



should teach them to understand the concepts and laws of atomic and nuclear structure, to perceive the unity between them[6,7,9].

Summarizing the above points, consistency can be defined as follows: "Consistency in teaching represents the connection between the stages of development of knowledge, skills, skills and competencies. The knowledge gained at the initial stage of training is preserved and used to acquire new knowledge at the next stage. Old and new knowledge are united and become a whole, that is, a whole." Therefore, the above points confirm that it is important to ensure the integrity of physics education in the process of teaching students. Therefore, in order to illuminate the didactic foundations of this principle, it is necessary to determine the essence of the principle of coherence in the philosophical, physical and educational process. In the history of philosophy, the problem of coherence was first illuminated by Hegel. In the process of developing the law of negation of negation, he proved that negation is not only the elimination of the old situation, but also that something from before is preserved in the new situation and it is a necessary basis for its future development[10,12].

Integrity as a philosophical category is a connection between the elements of the full stages of being and knowledge, and its essence is that the parts of the whole are preserved in the process of change as a system. Coherence connects the past with the future and ensures the stability of the whole. Therefore, in modern philosophy, integrity has a single interpretation: integrity is the fact that some elements of the previous state of the new thing that came into being in the process of development of material objects have been preserved [11,14].

So what is the role of coherence in physics? A clear example of the application of the principle of continuity in physics is the principle of adaptation. Since this idea is of great importance in the interpretation of the formal development of quantum mechanics, we will briefly review the history of its emergence [11,15].

DISCUSSION AND RESULTS

The main challenge was to understand the relationship between quantum and classical physics. M. Planck's law of radiation was based on the discreteness of energy, which contradicted classical physics. The definition of the law required departures from the framework of classical physics. In addition, the Planck formula for the spectral density of energy radiation includes the limit states of the Rayleigh-Jinns and Win formulas. The Rayleigh-Genes formula is based on classical principles, i.e., the law of equal distribution of energy in space. Therefore, M. Planck's formula did not stray too far from classical physics, but it is compatible with the existing laws of electrodynamics within certain limits.

The introduction of photons by A. Einstein restored the corpuscular theory of light. But since the concept of speed is included in the formula of photon energy, it was impossible to talk about the exchange of wave theory[2,3].

N.Bohr's postulates were also based on M.Planck's ideas improved by A.Einstein and applied based on special laws. Its main purpose is not to interpret or confirm these postulates, but to check the ability to explain them [5,6].

Based on the Bohr theory, the spectral regularities of the hydrogen atom are explained. The application of this idea to multi-electron atoms broadens its scope, but also clarifies the relationship with classical physics. His monographic work "On the quantum theory of radiation" published in 1916 [3] led to a shift in this direction. In this monographic work, A.



Einstein determined that the probability of emission and absorption of radiation by a body with a certain acceleration is similar to an electrodynamic system.

Bohr's postulates showed that Planck's formula could be derived for the spectral density of energy radiation. It is here that A. Einstein considers spontaneous and induced transitions for the first time and introduces the concept of probability coefficient. But here the ideas of probability did not gain importance in quantum theory. A. Einstein used probability coefficients for the process of transition from one stationary state to another. As a result, there is a sense of similarity between new and old ideas, in addition to marginal adaptation. Until then, adaptation of boundary transitions was considered to be characteristic only of particles, but now it is also related to speed.

It is this assumption that makes the correspondence relation a powerful heuristic principle. Despite the fact that there is a big difference between the classical and quantum mechanisms of radiation, relying on it, it is possible to create a copy of the quantum mechanism. This situation is the result of N. Bohr's new step - the idea of structural compatibility of mechanism elements. Based on this correspondence, several results have been achieved with the radiation of atoms in the quantum theory. The phrase "principle of compatibility" was first used in the 20s of the 20th century. In the development of the quantum theory, N. Bohr applied the principle of compatibility in the radiation process of atoms, and on this basis, in 1921, D. I. Mendeleev's periodic law was explained[9-10].

The relativity principle seems to act as a bridge between classical and quantum physics. From a philosophical point of view, the principle of compatibility justifies the development of physical theories not on the basis of mutual exclusion, but on the basis that they rely on each other. In this interpretation, the principle of compatibility can be considered as a natural-scientific proof of the dialectical doctrine of relative and absolute truth [3,5,7].

CONCLUSION

In conclusion, it should be said that the concept of unity in opening a wide path to modern knowledge, improving the education system, reflects the objectively existing development in nature, society and thinking, describes the links in development and the development of links. Since didactics is a theory of teaching and learning, it should describe the development of these processes. Therefore, coherence refers to didactics, which is a didactic concept;

- Since unity is a philosophical concept, it is related to the categories of philosophy. For didactic research, it is important to analyze the connection in such concepts as "integration and generalization", integration and interdisciplinary connection, "integration and systematization";

- since development has quantitative and qualitative aspects, based on the connection between the concepts of coherence and generalization in knowledge, it is necessary to look at the types of coherence in accordance with the level of development of knowledge. Therefore, this method can be applied to didactic research;

- coherence forms the methodological basis of psychological, pedagogical and didactic research work.

Based on the conclusions stated above, the following definitions of continuity can be given: continuity in education is the connection between different stages in the development of



knowledge, skills, skills and competencies. At the previous stage, acquired knowledge is stored and new knowledge is consolidated.

Sufficient mastering of probabilistic-statistical ideas not only expands the knowledge of students, but also effectively contributes to the formation and development of their scientific outlook. It also shows the organicity of their development. It strengthens the formation of probabilistic-statistical thinking skills in students, which occupy the main place in their practical activities.

Students get acquainted with probabilistic-statistical ideas first in mathematics (6th grade) and later in chemistry and physics lessons. The process of their practical application is visible in chemistry and physics classes. Separation of program materials into general physics, general chemistry and professional knowledge in the departments of taught physics and chemistry;

- to include materials related to school physics-chemistry courses into professional knowledge and to create an opportunity to apply the principle of coherence to them;
- general physical and general chemical knowledge, educational materials for school that are not directly related to physics and chemistry courses, but without which it is impossible to acquire professional knowledge; development of a suitable methodology for teaching probabilistic-statistical ideas and requirements for its mastery;
- conducting seminars on physics and chemistry courses, conducting facultative courses and demonstrating the existence of the principle of coherence in the study of probabilistic-statistical ideas and concepts at different stages of teaching.

Experiences show that teaching physics and chemistry in such a way not only creates an opportunity to thoroughly and deeply study probabilistic-statistical ideas and concepts, but also the practical application of the didactic principle in students forms skills, qualifications and competences.

Such a way not only increases the quality and effectiveness of teaching physics and chemistry, but also increases students' interest in these subjects. At the same time, uniformity is achieved in the formation of atomic and nuclear structure among students of physics and chemistry.

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