International Journal of Social Science And Human Research

ISSN(print): 2644-0679, ISSN(online): 2644-0695

Volume 04 Issue 11 November 2021

DOI: 10.47191/ijsshr/v4-i11-41, Impact factor-5.586

Page No: 3360-3362

Use of Didactic Principles in the Teaching of Molecular Physics in the System of Continuing Education

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ABSTRACT: This article describes the didactic basis for the application of the principle of consistency and coherence in the teaching of molecular physics in the system of continuing education. Currently, the education system is being gradually improved. This is why today's pupils and students need to have enough knowledge to have enough knowledge and find their place in society. An effective result can be achieved by organizing the educational process using modern techniques and technologies, pedagogical technologies and didactic tools of teaching, using didactic principles in their place. This article have some information about the didactic principles, their content and essence, the coherence and consistency of their implementation in the educational process.

KEYWORDS: Consistency principle, continuity principle, classical and quantum theory, teaching methods, continuing education, didactics, molecular physics.

THE MAIN FINDINGS AND RESULTS

The laws of teaching are necessary and objective, profound and periodically repetitive connections between the processes of learning. They mainly connect the main elements of the educational process, i.e. the educational process and the needs of society, the purpose and content of teaching, teaching technology and elements, teaching methods, organization of education, learning outcomes and its verification, and so on.

The rules of education are as follows:

a) It is necessary to organize modern teaching.

b) The teaching process must meet the needs of the community and each student or learner.

s) The educational process should perform the functions of education, upbringing and development.

d) The teaching process should be tailored to the actual learning opportunities of the learner or students.

e) The teaching process depends on the external conditions that affect it, ie the educational process and the pedagogical and psychological laws of teaching; the content of education is directly related to the purpose of teaching, teaching methods, all components of the teaching process, and the psychological characteristics of the student.

In order to implement these laws and regulations in the educational process, it is necessary to provide students with didactic principles. Because didactic principles apply to a common goal, they are the main project that defines the content, form, and methods of the educational process [1, p. 31].

At present, many didactic principles have been analyzed and redesigned in accordance with the needs of society and the achievements of pedagogy. They consist of the following effective didactic principles:

Consciousness and activism, demonstrativeness, systematicity and consistency, solidity, reliability, scientificity, connection of theory with practice, historicality, principles of humanism.

However, some didactic principles have not been fully reflected in the teaching of many academic subjects. Examples of these are the principles of membership and consistency. Especially in the teaching of molecular physics, these principles have not been developed in accordance with the modern student.

The essence of the principle of continuity is that in the process of transition from one state or stage to another, some elements or parts of the overall system are preserved. In the process of scientific learning, membership is related to the principle of adaptation. In didactics, it means that the next stage is organized on the basis of the previous stages. It also implies that different types of school teachers, higher education students, organize the content of functional activities. In this sense, membership means the need to preserve and develop the core of physical knowledge during the transition from one type of education to another.

The basic concepts of molecular physics are formed in the early stages of continuing education, i.e. in preschool education. For example, the concepts of solid, liquid, and gas, or the change of seasons, the presence of wind, precipitation in

nature, and other phenomena. These concepts are gradually developed during the school period. In higher education, their scientific aspects are studied perfectly.

We have divided the study of molecular physics into four stages in the system of continuous education.

1. The distribution of substances in nature in the first stage, information about the main types. Such information is taught in physics and chemistry courses in the middle grades of the school. It is advisable to convey this information to students only in a simple, clear and consistent manner. For example, the types of solids are explained to students on the basis of continuity through real-life examples. There are currently five types of solids (two types of solids are studied in school textbooks), including crystals - amorphous bodies - ceramic bodies - polymers - glassy solids.

2. The second stage involves a micro-explanation of the phenomena being studied. For example, the microstructure of substances, chemical bonds of particles, their differences and their application to physical processes (deformations, thermal conductivity, and electrical conductivity, magnetic and optical properties) are explained in sequence. Such information is provided in the upper grades of secondary school and, in more complete form, in academic lyceums in-depth study of the natural sciences.

3. In the third stage, the application of substances or bodies to physical processes is explained in detail through various theories and laws. For example, when the structure and interaction of substances are studied through molecular kinetic theory, the thermal conductivity of substances is explained by Dulong-Pti's law and Debay's theories. This information is provided in general physics courses at the 1st and 2nd stages of higher education. In this case, students will be able to get acquainted with the principles of application of solids in the national economy and life, the use of physical phenomena and laws.

4. In the fourth stage, students develop a deep knowledge of the dialectical-materialist methodology of application of molecular physics to physical processes through fundamental modern quantum theories, as well as the ability and skill to apply the theory in practice. Such information is studied by students in the 3rd and 4th stages of higher education in the courses of theoretical physics and solid state physics.

At this stage, maintaining continuity in the education of pupils and students is of great importance.

Consistency is seen as a connection between phenomena in nature, society, and cognition, when a new, old one takes its place, retains some of its elements, grows on the basis of the old, struggles to accept it, because without conservation there is no enrichment and accumulation. Rejection is not development and renewal. Consider the implementation of continuity in the example of physics in the teaching of natural mathematical cycle sciences.

The principle of coherence of education is one of the basic principles of philosophy, which is manifested in physics in the form of the principle of conformity. Its methodological basis is the law of negation of dialectics. According to the principle of consistency in physics, any new theory must incorporate the basic results of the previous old theory [1, p. 38].

In defining, consolidating, and expanding knowledge of molecular physics, attention should be paid to the dialectical connection of the old with the new. For example, knowledge gained or introduced by laws and theories about the study of substances is reinforced. In particular, it will always be necessary to prove that the state of the old theory arises from the new theory. In particular, a special branch of physics deals with the problem of many particles of matter, statistical theoretical physics. Quantum theories are mainly used in statistical physics. A special case of quantum theory is classical theory. An example of this is the heat capacity of substances.

The basic law of the classical theory of heat capacity is Dulong-Pti's law, i.e. $C_v=dE_N/dT=3N_Ak=3R$. This law is only valid for some crystals at high temperatures. The theory that can fully explain the heat capacity of solids is quantum theory, i.e. Einstein's law. $C_v=dE_N/dT = 3N_AkF(w,T)$. At high temperatures $F(w,T)=1$, and this Einstein's formula becomes Dulong-Pti's law. [2, p. 80]. There are many such examples. In the study of the physics of the structure of matter and other phenomena, the introduction of classical and quantum theories, as well as the concepts of their interrelationships, is of great importance.

In addition, the use of interesting quality issues based on didactic principles at any stage of education is also important. For example, the structure of solids, their melting and solidification, how they are formed, and their transformation into crystalline-amorphous or amorphous-crystalline processes are illustrated by examples of their physics (e.g. Such questions encourage students to think and observe. The answer is a simple Glass amorphous body that over time begins to crystallize, meaning that their particles begin to move from a disordered state to a disordered state or to a crystalline state due to internal forces. The opposite question: How are bottles formed? The answer is that the molten crystals cool very quickly. In physics, in a molten crystal, the particles are in a scattered or fluid state. When they cool down too quickly, the particles do not have time to settle at the nodes and become amorphous.

CONCLUSION

From the above it is clear that in the formation and development of concepts related to molecular physics in students, it is necessary to follow the principles of continuity and consistency, ranging from simple to complex. Therefore, in order to provide a deeper and more complete understanding of these phenomena, the adequate use of modern pedagogical technologies and

computer technology will lead to better understanding and long-term memory of physical concepts by students, increasing interest in physics.

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