SCIENTIFIC CONTENT OF PHYSICAL CONCEPTS AND SIGNIFICANCE

Uzokova Gulnoza Saydullaevna
Associate Professor of Karshi State University
Узикова Гульноза Сайдуллаевна
Доцент Каршинского государственного университета
Xujamberdiyeva Jamila Norkobilova
Senior Lecturer at the Department of Physics
Хужамбердиева Жамила Норкобиловна
Старший преподаватель кафедры физики

Annotation: This article discusses consepts of physics, its scientific meaning and importance and formation of physical cognition. The importance of physical concepts in the study of natural phenomena, the role of students in the development of the scientific worldview, the issues of their formation in the educational process in a logical sequence, in accordance with the purpose.

Keywords: Physical concept, scientific worldview, matter, matter, Interaction and power, the physical landscape of the universe.

Аннотация: В статье рассматриваются физические понятия, их научное содержание и значение в формировании физических знаний, этапы формирования. Значение физических понятий в изучении природных явлений, роль студентов в развитии научного мировоззрения, вопросы их формирования в учебном процессе в логической последовательности, в соответствии с целью.

Ключевые слова: физическая концепция, научное мировоззрение, материя, вещественное взаимодействие и энергия, физический ландшафт вселенной.

Since the dawn of time, mankind has sought to protect and use as much as possible the structure and properties of all that surrounds it, as well as the causes of natural phenomena. In the process of studying such material things and phenomena in the universe, a set of knowledge began to take shape as a science.

Within these sciences, physics has a great basis and potential in understanding the structure of the universe and the laws of its change.

All phenomena and processes in the material world are reflected in the concepts, ideas, principles, laws and theories of physics in the form of the results of theoretical and practical study of nature. Therefore, the discovery of the

essence of nature and the phenomena in it (along with other natural sciences) is of great importance in the formation of the scientific worldview of young people.

The importance of physical concepts in the study of natural phenomena. In the theoretical and practical study of the material world, physical concepts, ideas, laws and theories emerge. Discovering the essence of physical concepts in the study of the nature around us and the phenomena in it is of paramount importance and plays an important role in shaping the scientific worldview in students. Concepts include material knowledge, knowledge of the aspects and properties of events, and the interrelationships between them.

Concept - a voluntary scientific system, which characterizes the highest form of knowledge, is the logical basis of theories, in other words, the concept is the highest product of our brain.

The process of long-term cognition, which has been tested in practice, grows and develops, and on the basis of the end of cognition an understanding is formed, on the basis of experience the essence of the concept is revealed.

Scientific understanding is a product of thinking. We think about the role of physical concepts in the school physics course and its formation. The in-depth methodological significance of scientific concepts includes the following.

1. Scientific concepts are a form of reflection of being in the human mind. It reveals the essence of things, their primordial properties, characteristics, its nature and its connection with the world around it.

2. Scientific understanding - the end of the development of the cognitive process, means a generalized conclusion.

3. The scientific concept also changes, enriches, expands and becomes clearer in terms of the development of science, the growth of human knowledge, its content and essence. With the development of science and technology, the direction of concepts also changes, exchanging new ones and denying the old ones.

Scientific concepts will be interconnected. The voluntary aspect of knowledge, any science, any theory, every course of study, is characterized by a set of concrete concepts that are interconnected. We see this clearly in the natural sciences.

The physical concepts studied in the high school physics course are important concepts of classical physics and modern theories - quantum mechanics, theory of relativity, electrodynamics, nuclear physics.

The study of physics begins with physical concepts. It is clear that nothing can be said about natural phenomena without a clear understanding of the physical concept.

Formation of physical concepts in teaching physics. One of the most important tasks in the teaching of physics is the formation of a set of scientific knowledge and concepts in students in a logical sequence. The formation of concepts in the educational methodological literature, the dynamics of its development is not sufficiently covered, only examples are given.

The concepts of work and energy Yu. I. Sokolovsky, Yu. E. Duraseevich and L. I. Reznikov developed a number of concepts, such as the physical landscape of the universe, the physical field, the heat of matter and the inexhaustibility of its knowledge, the theory of relativity. F. Illuminated by Efimenko.

If the concepts of physics are taught step by step, their meaning and essence are logically correct, only when their content is methodologically scientifically analyzed will it be possible to better study and reveal physical phenomena. With the help of physical concepts, the essence of mysterious phenomena in nature is revealed, and the laws and ideas that characterize the occurrence of these phenomena develop, change, acquire new meanings and expand as the process of cognition develops.

When we analyze the methodological literature available to date, we see that the essence of physical concepts is not well understood and sufficiently developed, and that many (especially young people) need such developments. Physical concepts should be inextricably linked with other forms of dialectical thinking, such as analysis and rounding, systematization and generalization, in the growth of students' mental thinking activity in the teaching process.

The emergence and content of this or that physical concept, its development, its connection with other concepts, in some cases can lead to the incorrect formation of concepts due to the fact that the boundaries of its application are not separated. For example, the materialization of power; such as generality and specificity between work and energy.

Sometimes the introduction of physical concepts is dogmatic in nature. Concepts such as matter, matter, physical field, interaction, physical view of the universe, elementary particles, relativity, space, time, the diversity of the structure of matter are sometimes incomplete and incomprehensible. In some cases, physical quantities are limited by mathematical connections (e.g., the concept of work, the laws of thermodynamics, electromagnetic waves, the law of connection between mass and energy, etc.).

Our teachers pay almost no attention to the gradual formation of physical concepts. Due to the lack of attention paid to the role of physical concepts in the development of students' scientific worldview, its essence is not revealed or misinterpreted, leading to metaphysical, dogmatic thinking of a physical

phenomenon, which contradicts the scientific worldview. Therefore, the correct analysis and interpretation of physical concepts from a methodological point of view, its formation leads to a correct understanding of the physical law, ideas.

Although the issue of methodological activation of students in teaching physics has recently been revived in theory, its practical application is very slow, and the lack of methodological literature in Uzbek on the implementation of this issue makes it even more difficult.

To do this, each teacher must be provided with sufficient methodological literature in this area, the teacher himself must have sufficient methodological knowledge, be prepared in terms of philosophical literacy in the explanation of each physical phenomenon.

In the scientific analysis of physical concepts it is necessary to pay attention to the following:

1. The structure, content and scientific interpretation (definition) of the concept (what is the personal property of the material object representing the concept, the form of existence of matter in the concept, what interactions and interrelationships characterize the phenomenon);

2. The importance and role of the concept related to the physical theory being studied.

3. The development and change of the physical concept studied in terms of the development of the physical landscape of the universe .

4. The scope of application of the concept.

5. Criticize and correct errors and confusions encountered in the study of this concept.

As evidence of the above, we consider the stages of formation of some concepts:

The concept of matter and space. One of the key elements in imagining the modern physical landscape of the universe is the two views of matter - the concept of matter and space, because the concept of physical field plays an important role in all physical theories. A. Einstein said, "Neither a charge nor a particle can describe the connection between physical phenomena in space, and the connection between a charge and a particle can only be accurately described in space" (A. Einstein. Physics and reality. M., "Science", 1965).

The doctrine of the structure of matter has not yet been fully and fully elucidated in some educational and scientific literature, and the concept of field has not been sufficiently developed in the form of a type of matter, although it has been included in the educational literature in recent years. Many Methodist scholars have noted that it is not methodologically expedient to liken matter to a

particular substance.

When graduating students are asked to describe matter, we witness the materialization of matter. The fact that there is still a lack of understanding of the materiality of the physical field can be said to be the result of insufficient application of the concept of the physical field, which is a type of matter.

In many cases, there are also gross errors, such as likening the field to energy. This can be clearly seen when talking about the evolution of a type of matter. For example, V. Heisenberg's claim that "all elementary particles can rotate together or that they are composed of simple kinetic energy" is a mistake in a very idealistic interpretation of the fact that the field view of matter is composed of energy, which is the form of life (form of motion). Demak. the teacher must have a clear understanding of the appearance of matter and space, the relationship between them.

The appearance of matter is sufficiently well illuminated at all stages of the physics course. From the 7th grade onwards, matter, matter, structure, properties and states are studied on a large scale (macroscopic and cosmic bodies, invisible microorganisms, the state of matter, the atomic and molecular structure of matter, elementary particles, various interactions of matter, etc.). However, there are methodological shortcomings in such a study, which should be noted :

First - information and evidence about the structure, properties of the substance are given in a strictly unordered manner;

Second - because the concept of matter and its main features, its properties are not clearly defined - students, even some teachers, can not give a clear definition of the concept of matter;

Third - the formation of the concept of matter is not sufficiently consistent with the concept of matter, the interaction between matter and the physical field is not methodologically justified;

Overcoming these shortcomings remains one of the challenges in improving physics teaching methodology. The concept of matter is first encountered by students in the seventh grade. There are only two definitions: "Matter exists in two forms, one of which is called matter," and "What physical bodies are made of is called matter." We do not see any definition or description of matter in any other textbook. the body is also not described).

What is a body? What does his condition depend on? By macroscopic body we mean a set of particles. In a broad sense, a large set of particles is called a body. The substance can be in solid, liquid, gaseous and plasma (flame) state. In the case of microstructure and thermal motion, the body has a different character. The particles that make up the gases move randomly. In a solid

crystalline state, the particles are constantly oscillating around a medium equilibrium state (at the nodes of the crystal lattice) without advancing like a gas. In liquids, on the other hand, it is useful to give a clear idea that particles are in a complex motion consisting of a combination of forward and oscillating motions. In the school physics course, the concepts of matter and field should be gradually clarified, taking into account the age characteristics of the students, and they should be able to:

1. Matter is one of the main types of matter, which has an atomic-molecular or plasma structure.
2. Matter is composed of elementary particles that have a mass at rest.
3. The particles of matter are diverse ($0 < V < C$ intervals).
4. Invisible physical bodies (atoms, molecules, etc.) are macro-objects and macro-bodies, as well as planets, stars, clusters of stars, etc., called cosmic bodies.
5. Matter is interconnected with a physical field, which is another type of matter (Material bodies form different systems with their particles only through the field). Matter and space can rotate with each other. They have many common features.
6. All phenomena occurring in matter follow the laws of conservation of mass, energy, momentum, momentum, and electric charge in physical processes. At the same time, it reflects the fact that matter and its motion do not disappear and do not appear .

Although the methodology for shaping the concept of the physical field in students has been developed by Methodists, the idea that the field exists independently of the source is poorly covered in textbooks. The whole set of elementary particles manifests itself macroscopically in the form of matter and space as a whole with the interactions between them.

The substance has special properties in contrast to the field. We know the exact existence of the physical field from the presence of light and radio waves. The field has a limited propagation speed. When the Moon is located by a radio wave, the radioacado returns in 2.5 seconds. The source of the electromagnetic field is a charged particle in motion. The scheme of charge interaction is: particle - field - particle.

Field is a type of matter that can move independently in space, separated from its source. Such an area is of a wave nature. Through an interaction (stick) on a billiard ball, or as if an apple on a tree is struck by a stone, the radio carries an electromagnetic field from the source to the receiver (receiver) and acts on the radio receiver antenna, generating EYUK in it.

How do we get information from stellar matter? In the atomic processes

that take place in the outer layer of a star, an electromagnetic field called a stronger radiation is emitted by the wave and propagates at the speed of light independently of the cosmic cavity. In the oscillation of charged atoms in the form of atoms awakened in the outer shell of a star, the electromagnetic field that propagates around it carries a lot of information from the source. It is known that each atom of a chemical element emits and absorbs a specific light - spectrum. With the electromagnetic field in the form of light scattered from the stars to the universe, it is possible to speculate about the temperature of the star in which corner of the universe, the chemical elements in it. By the same method, we get information not only about the structure of the stars, the Sun, which is the source of life on Earth.

In the process of teaching physics, the concept of field is rarely used in the interpretation of a number of phenomena that occur to people as a result of the interaction between the two types of matter, revealing its nature, its laws. For example, the interaction of matter with matter (between fields) as a type of matter in the field of events such as photoelectric effect, luminescence, interference, polar luminosity, dispersion is ignored.

Instead of looking at space as a second type of matter, there are different approaches in different books. For example, S.E. Frish and A.V. In Timoreva's book, The General Physics Course, the field is called "Special Type of Matter," while K.A. Putilov, S.G. Kalashnikov, N.D. Papalexi, as well as L.D. Landau and S.G. In Lifshitz's books and manuals, space is seen as a "physical reality." A. Einstein sees field as a reality, where energy is sparsely concentrated, where there is energy, where energy is concentrated, where matter is matter, and matter is a reality that differs from field by concentration of energy.

In general, space is defined as a type of matter (not a form of life), but it differs from matter in macroscopic processes.

The concept of mass is a deeply philosophical concept that goes back to the concepts of space, time, and motion in relation to the concept of matter.

The concept of mass is a reflection of some basic properties of matter. We see this in this or that physical study:

- The body is expressed in Newton's laws as a measure of inertia (inert mass);
- The fact that there is a measure of gravity (gravitational mass) between objects is seen in the law of universal gravitation;
- Although it is a measure of the energy of a moving body (taking into account in the competitions of wrestlers, boxers, weightlifters), the relationship between mass and energy: at $E = \Delta m s^2$ it is thought that the mass changes

depending on the speed of movement;

- Description of electromagnetic processes as electromagnetic mass;
- Characteristics of the structural connection of elementary particles (in the description of the relationship of mass defect-rest mass with the structure of matter);
- Classical atomism as a measure of the number (quantity) of particles in a body (matter), in chemistry, in the production of material goods in the national economy;
- The existence of a coefficient of proportionality in the mathematical writing of various phenomena (mathematical aspect of the concept of mass). For example, mass serves to play the role of a coefficient of proportionality in expressing the relationship between the acceleration of an object and the force acting on it.

Based on the work done in this area, we will focus on how to explain the concept of mass in the teaching of physics:

1. Define the concept of mass.

2.Other of the concept of mass. determine whether the concepts are related (matter, motion, interaction, space, time, energy, work, etc.).

3. Analysis of the concept of mass in terms of the development of the physical landscape of the universe.

4. To understand or take into account the concept of mass from a methodological point of view (metaphysical and idealistic - to criticize its interpretation). We see that there are some difficulties in explaining the concept of mass in the existing methodological and scientific literature ("mass - the amount of matter" or "amount of matter")

In classical atomistics, the interpretation that mass is the amount of a homogeneous, variable particle is still found in the statements of some teachers or observed in students ’responses, a concept that is erroneous.

The concept of mass cannot reflect all the properties of matter, because scientific education teaches that there can never be a particle that is the same for all "indivisible" bodies.

Modern science has shown that classical physics is limited, and has proved that many of its conclusions (including those about mass) are incorrect. That is why it is useless to replace mass with the amount of matter, that is, it is a mistake to liken mass to matter.

As a mass concept, we see that matter (matter) reflects properties such as inertia, gravity.

One of the most important properties of matter is inertia and gravity,

which is manifested only in interactions. In this case, the mass serves as a measure of the qualitative and quantitative characteristics of the inertia, gravitational properties of matter. From the laws of relation of mass and energy, it can be seen that mass is a measure of the total energy in a body. It is safe to say that the concept of measurement is a concept that characterizes this or that property of matter, both quantitatively and qualitatively, and represents the properties of matter.

In explaining the law of interdependence of mass and energy, care must be taken that the idealistic meaning that mass turns into energy does not arise, as in some literatures.

Proponents of the idealistic theory conclude that mass in the formula $E = \Delta ms^{2\ converts}$ into energy, energy into mass, and claim that mass, like matter, loses mass and becomes energy (Puankare, Ostwald, Max, etc.).

Such conclusions were drawn by S. Vladimirov and M. It can also be found in Karev's pamphlet Quarks and Elementary Particles (M. Znanie, 1985, pp. 14-15).

In explaining the phenomena that occur in the interaction of elementary particles, it is necessary to take into account when explaining the relationship between the quantum energy of light and mass. So here we see a change in the concept of mass, both quantitative and qualitative.

It is necessary to draw a dialectical conclusion that when matter passes from one state to another, its mass and energy are manifested in both quantitative and qualitative changes.

The concept of interaction and power. The concept of interaction is one of the main concepts of the physics course, and all the studied phenomena underlie the processes. Lack of understanding of the interaction - not knowing that events occur in nature, can lead to illegal conclusions.

In some methodological literature, the concept of interaction is not properly covered in the analysis of events. In many cases, the concept of interaction in nature is replaced by force in nature. All phenomena that occur in nature occur through physical fields.

The nature of the interactions in the learning process remains unclear, depending on the physical field. The role of the existing field in gravity, nuclear, electrical processes, the interaction through the field remains unclear. The correct formulation of the concept of interaction allows the study of the whole course of physics on a scientific basis. Because at the heart of all physical phenomena and changes is interaction. To explain from a scientific point of view that physical phenomena occur in nature in a variety of forms, it is necessary to be well acquainted with the concept of interaction.

While any material object has a complex structure, a variety of internal and external interactions are involved. Because all bodies and objects in nature are all separate, interconnected, interconnected.

The gravitational, electromagnetic, and weak nuclear interactions known to us differ qualitatively from each other in their location and symptoms. Let's take a closer look at these interactions.

Gravitational interactions are the attraction of objects to the Earth, the existence of the solar and stellar systems is reflected in the presence of gravity. This interaction is universal, it can be applied to any micro and macro, mego objects. However, this interaction is noticeable in bodies of very large astronomical mass and is reflected in the structure, formation and development of the universe as a whole.

The mass of gravitational interactions decreases significantly in small bodies and in practice does not play a major role in a number of nuclear and atomic systems.

electromagnetic interactions in the bonding of any macro-organisms, molecules, and particles in an atom. The ionization of an existing atom, in other words, the energy required to separate an electron from a nucleus, indicates the magnitude of the electromagnetic interaction present . This heat of formation, i.e., the energy of vaporization of a liquid (under atmospheric pressure), indicates the presence of intermolecular bonding interactions. Hence, the factor that binds the particles in macro-organisms is the electromagnetic interaction.

Strong (nuclear) interaction - the presence of the same charged protons and neutrons in the nucleus would not have existed if there had not been a very strong intense interaction from the electromagnetic interaction. The interactions that occur at the boundary of the wool core are called strong or nuclear interactions.

Strong interactions occur between a proton and a proton in the nucleus, a proton and a neutron, a neutron and a neutron (pp, pn, nn). Strong interactions are only between nuclear particles the same happens between all baryons and criteria.

Weak interaction - particles from a list of many elementary particles are considered stable. Under the influence of "internal causes", unstable free particles turn into other particles at one or another characteristic moment of time. Resonances **scattering of** so-called particles during a strong interaction for $\sim 10^{-23}$ s, similarly scattering under a neutral p ^{0} = criterion electromagnetic interaction was found to be $\sim - 10^{-16}$ s. Over a period of 10^{-10} -10^{-6} s, decay occurs in an interaction known as a weak interaction.

Weak scattering of elementary particles has been reported to occur

during neutrino irradiation. This particle (neutrino) interacts extremely poorly with matter. When this particle interacts with ordinary matter, its free path (the range of two consecutive collisions) forms an astronomical number (10 to ^{17} km). Our Earth, with a radius of 6.4 * 10 ^{3} km, would be absolutely transparent to neutrino currents.

If we want to compare the four interactions in terms of intensity, we can place them in the following order in terms of strength:

Strong interaction ..... 1 say,

Electromagnetic interactions ..... 10^{-3}

Weak interaction ..... 10^{-14}

Gravitational interactions ..... are in the order of 10^{-40}.

From the point of view of the structure of the universe and its evolution, the gravitational interaction as a whole plays a fundamental, decisive role. But if we look at the structure of matter at all stages, we see that each interaction has its own place and scale.

Interaction is closely connected with the concepts of motion, space, time. This is why the concept of interaction is so important in scientific knowledge. In formulating the concept of interaction, it is necessary to pay attention to the following:

1. Interactions do not exist in any material body.

2. Interactions between objects are the source of all kinds of actions. At the heart of all natural phenomena and processes in nature lies the interaction of species of matter.

3. The interaction is associated with the migration of matter in space. The interaction is transmitted at a finite velocity ($y \leq c$) without occurring at a distance in an instant.

4. Since the interaction of the physical field is not perceived by man, the interaction between the fields has the character of exchange. But the perception of the result is reflected in the indicators.

5. Various interactions are mainly divided into four main types (nuclear, gravitational, electromagnetic and weak interactions) that are evident in modern physics, and each has a physical field.

6. The concept of interaction is related to the interconnectedness, interdependence, cause and effect of events in nature. The essence of the idea that one cannot know the laws of nature without knowing the interaction must be revealed.

Interactions are a general form of connection between objects and events that cause them to change. Therefore, the interaction should be the basis for the study of the phenomena studied in the whole physics course.

The concept of power should not be replaced by the concept of interaction. Force is a quantitative measure of the interaction of bodies, a quantity that is manifested in the interaction of bodies. Force in mechanics is manifested by the acceleration (or magnitude of deformation) that a body receives in the form of a measure of the mechanical interaction of bodies. In other words, "force is a measure of the displacement of mechanical motion, determined by the product d (my) / dt obtained over time from the amount of motion moving from one object to another during the interaction. Thus, force is considered to be" one of the general characteristics of the concept of interaction.

The interactions of bodies are quantitatively characterized not only by force, but also by a number of other physical quantities, such as energy, momentum, which more deeply and fully reflect the interaction between material objects. At this time, force is only a definite quantitative characteristic in mechanics. But the concept of force cannot be applied to thermal phenomena, chemical reactions, processes of an organic nature, the interaction of elementary particles, in which case the concept of energy has a wide range. Therefore, from a methodological point of view, it is necessary to pay attention to the following in the formation of the concept of power in students:

1. Force is a measure that qualitatively and quantitatively characterizes the interaction of material objects (serves as a measure in the interpretation of the acceleration and deformation of the body in mechanical interaction.)
2. Force - a vector is a physical quantity that characterizes both the direction and numerical value of the movement of motion from one body to another.
3. The concept of force is not only related to the concept of interaction, it is inextricably linked with many other concepts (force moment, momentum, momentum of impulse, field strength, work and force, etc.), which play an important role in the formation of these concepts.
4. The concept of force - the interaction of material bodies is both a quantitative and a qualitative characteristic, and the cause of the events is also gypsum connected (ie, there is no cause without cause).

When we talk about electric, molecular, nuclear forces, we mean the rotation of the non-mechanical form (movement) of motion.

Power should not be replaced by interaction. Power is not a measure of interaction, but a measure of interaction. The cause of the self-contraction of a body motion is not the force F, but the interaction with another moving body ("standing" or with another moving body).

Physical concepts should be inextricably linked with other forms of

dialectical thinking, such as analysis and rounding, systematization and generalization, in the growth of learners' mental thinking activities in the learning process.

If physical concepts are taught step by step, their meaning and essence are logically correct, it will be possible to better study and explain physical phenomena and laws only when their content is scientifically analyzed methodologically. With the help of physical concepts, the essence of mysterious phenomena in nature is revealed. The laws and ideas that characterize the occurrence of these phenomena are also evolving, changing, gaining new meanings and expanding as the educational process develops.

All phenomena, processes, ideas, principles, laws and theories in physics, theoretical and practical study of nature - are reflected in the form of the conclusion of the correct and complete formation of physical concepts. Therefore, in the study of nature and the phenomena in it, the discovery of the essence of physical concepts is of great importance and plays an important role in the formation of the scientific worldview in learners.

REFERENCES

1. Efimenko V.M.Metodologicheskie voprosy shkolnogo kursa fizik . - M :, Pedagogika.1976.
2. Berdiev Ch . Physics o q pushing scientific world q arashni shaping.- T. , Reader , 1995 _ _
3. A.B.Ponomarev, E.A.Pikuleva “Methods of scientific knowledge in physics ” . –M: Nauka, 1985. 325 p.
4. S.V.Vladimirov, M.E.Karev " Quarks - elementary frequencies ". M. "Knowledge", 1985
5. A. Einstein. Physics and reality. M., "Nauka", 1965.