DEVELOPMENT OF PROBLEM TECHNOLOGY OF TEACHING IN PHYSICS

Ashirov Shamshiddin, Mamatov Abdurayim, Boymirov Sherzod, Sattarkulov Komil & Daminov Rahim
Gulistan State University, **UZBEKISTAN**

ABSTRACT

The author of the article provides information about creation of problem teaching technologies in electrodynamics in the branch physics.

Keywords: Talent, memory, patriotism, polytechnic education, dialectical character, technique, education and upbringing.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

The main objectives of teaching physics are:

1. Familiarization with the basics of physical science, the basic concepts, laws and theories, formation of the natural-scientific landscape of the environment around us in the minds of students, familiarization with the basic natural-scientific methods of research.
2. In the process of studying the material, along with enriching the memories of students, develop and their creative abilities.
3. Formation of scientific worldview of students.
4. To educate students in the process of teaching the basics of physics: ideological-political, military-patriotic, international, moral and labor education.
5. Provide students with the basic knowledge; prepare them for social work and conscious career choices.

None of them can be solved if it is separated from each other. All of them are performed comprehensively in the learning process. Strengthening their physics knowledge, develops dialectical-materialistic thinking of the student, forms a scientific worldview, and carries out polytechnic education.

At physics lessons are explained, that students can consciously know the world and the dialectical nature of the learning process; the material unit in the world, is matter and movement are inseparable, phenomena in nature are connected; the properties of the material of the world is infinite, the process of knowing is also unlimited. This means the correct formation of their worldview.

Learners are also introduced to the concept of the second appearance of matter - field, by studying the structure of substances from atoms and molecules.

Throughout the physics course it is necessary to show that matter manifests itself in two related forms, that is, in the form of matter and field. With the correct formation in the minds of learners of ideas about the material unity of the world, it is important to take into account the general properties of substance and field.

1. The concepts of Mass, energy, momentum, spin characterize both the particles of “field” and “substance”.

2. Wave-corpuscle dualism applies to both substance particles and field particles. The unity of corpuscular and wave properties is an important characteristic of all elementary particles.
3. As particles of substance are transformed into particle fields, particle fields are also converted into particles of substance in their turn.
4. Garnet can be resistant to particles of both species, as well as short-term survival.

Attentions of learner are necessarily to be paid to various structural systems (atom, molecule macronutrients) and to their formation. It is impossible to imagine the structure of substance without a field. Particles interact through a mutual field.

Due to the fact that the teacher slowly trains various motions in physics lessons, the student's motion leads to understanding that matter is an indispensable property.

At school, students are first introduced to mechanical motion, then molecular motion and then electron motion. When studying the phenomenon of electromagnetic induction, readers should pay attention to the relationship between mechanical motion (movement of a conductor in a magnetic field) and movement of electrons and formation of an electromagnetic field.

The absence of motion is reflected in the conservation law and rotation of energy. The initial understanding of energy is given in 6^{th} grade of the secondary school. In the process of studying electrical phenomena, the concepts of motion, which is new to learners, and the rotation of the corresponding energy are considered. Here it is worth paying attention to the transition of movement (energy) to new views.

In the process of teaching physics to learners are explained the interrelation of phenomena, their causes and patterns of development. For example: the cause of deformation is the interaction of bodies. The action of an electric charge (cause) creates a magnetic field (effect).

As for learners to be able to present a clear picture of the connections between events, their attention should be focused on finding important connections between events. Thus not only physical phenomena, but also others (biological, chemical and others) the ability to display links to events is also increased. For example: the electric field (cause) improves the development of the plant (effect).

Of great importance is the formation in the minds of learners that quantitative changes in nature lead to qualitative changes. This is stated in the explanation of the transition of matter from one aggregate state to another. It is mainly due to changes in the internal energy of the body and the interrelation of molecules.

In the process of studying the physics course in the minds of students are formed the struggle of contradictions, the law of equality. For example: explain the nature of light and corpuscularity of substance and its equality.

When forming a scientific worldview, it is of great importance to reveal the objective nature of the laws of physics, to demonstrate the possibility of cognition of natural phenomena. It is because that the laws of science are a reflection of the laws of nature. Therefore, when teaching each law, it is necessary to demonstrate it in practice and familiarize with its application. In some cases, laws are determined by experience. And in some cases, an experiment is used to confirm the correctness of the conclusions.

Throughout the physics course, learners must be confident that they can know the world. It is important to show that the development of science and technology reveals the secrets of nature, which have not yet been studied and not even imagined. For example: the study of atomic structure and the Universe.

By consistently studying physics course, learners are confident that they can know the world, the modern physical landscape of the world. They also have the skills of practical application of the dialectical method, since the development of physics itself is a dialectical way.

Physics has a rich material in the ideological and political education of learners. As you know, the policy of our state is aimed at improving human life. In this, a great role is given to the achievements of science and technology.

We explain to learners why the government pays great attention to a large number of divisions of physics (nuclear physics, plasma, solid state physics) or to acceleration of a certain direction of development of scientific equipment (increase in power of cars, increase in construction of hydroelectric power plants), their value in development of a national economy. At the same time, we ideologically and politically educate students, demonstrating the role of science and technology in the development of a particular area, in improving living standards, working conditions and meeting the cultural needs of people.

An important role in educating learners in the spirit of patriotism and internationalism in physics lessons is played by the life and work of major scientists and inventors. Talking about the scientific inventions of Beruni, Ibn Sina and others, it is necessary to dwell on their patriotism, science.

The task of the teacher is to show impressively and figuratively his achievements in the development of science, technology, culture of scientists and how their discoveries serve humanity.

At physics lessons many foreign scientists (I. Newton, B. Pascal, A. Popov, A. Einstein, M. Planck,V. Roentgen, G. Hertz, H. Huygens,) show that science and technology are international in nature. This contributes to the formation of students' feelings of friendship and respect for the peoples of other countries. For example: A. Einstein proved the theory of relativity, the stages of development of Astronautics in the study of jet propulsion. S. Tsiolkovsky for the first time created the engine working on liquid fuel. It should be noted that Korolev (head designer) made a great contribution to rocket and space technology (cosmonautics).

In connection with patriotic and international education, it is also necessary to educate learners in the spirit of military patriotism. It is advisable to do this in the following ways:

- explain to learners the role of physics in the defense of the Motherland, the construction of military equipment and weapons;
- demonstrate the application of the studied material (phenomenon, law) in physics lessons in military equipment;
- formation of necessary practical knowledge and skills in military service (measuring instruments, conducting computer work, etc.);
- output in the real world (speed, pressure, power) values of physical quantities found in military equipment in the process of solving the problem.

Thus, by teaching physics course to the learners can be trained in the spirit of military-patriotic education and form bombs ready to defend the Homeland.

One of the main tasks of education is to prepare learners for mental and physical work. At the same time, labor should be the first requirement of life.

In the process of teaching physics, the basis of labor education is polytechnic education; learners get acquainted with the leading industries. They study the physical basis of various manufacturing processes of machines and tools.

In the implementation of labor education has a positive impact training independent performance of laboratory work, training approximate storage devices and weapons in the physical office. Examples of the work of scientists and inventors in the education of youth in the spirit of hard work give positive results.

In physics lessons, it is necessary to form aesthetic imagination of learners, demonstrating the perfection and compactness of physics theories and fundamental experiences, the beauty and power of human thinking. In aesthetic education, a compact and formal solution of physics problems, demonstration of visual and formal experiments and demonstration of how beautifully, compactly made tools, as well as teaching students to write beautifully and orderly in notebooks, excellent homework, instilling to ensure that laboratory work is always performed clearly and beautifully.

The implementation of polytechnic education in teaching physics requires a consistent and logical approach to the practical direction of the course of physics with the development of science and technology in the modern world, and select the appropriate content and purpose method of learning.

The objectives of physics course in the implementation of polytechnic education are mainly as follows:

- development of scientific and technical thinking on the basis of familiarization of learners with modern physics principles of industrial and agricultural production;
- formation of learner's abilities (skills) to apply theoretical knowledge in solving physics and technical problems;
- formation of skills and abilities of use of the frequently used control and measuring devices, devices of management of energy sources;
- formation of learners' personal qualities, correct attitude to work, nature and technology, initiativeness.

Methods and forms of implementation of polytechnic education include:

1) explain the application of physics phenomena and laws;
2) demonstration of the principles of operation of machines and technical devices in practice;
3) display of movies and films with physics- technical content;
4) organization of excursions to the manufacture;
5) organization of independent observations of learners;
6) performance of laboratory works on studying of technical means;
7) organization of extracurricular reading of popular literature on physics-technical clubs and their exhibition at school.

The formation of practical skills and abilities of learners is one of the main tasks of polytechnic education. Ways to improve the effectiveness of skills and abilities are the followings:

1) increasing the number of laboratory works using previously studied instruments;
2) conduct short-term experiments that are reflected on different devices;
3) working with different handouts;
4) systematic testing of skills and abilities of learners during the lessons;

5) conducting extracurricular activities related to the use of various tools.

One of the important tasks of polytechnic education is the development of scientific - technical thinking of learners. One such development tool is to teach learners to find similar mechanisms and analogical and different sides of machines.

At the lessons of physics the following directions of technical progress are considered:

- mechanization of manufacture;
- manufacture of new materials and improvement of technology;
- thermal power engineering ;
- electrification;
- radio electronics, electronic and computer engineering;
- optical technology;
- automation of the manufacture.

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