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USE OF INNOVATIVE TEACHING METHODS IN NATURAL SCIENCE DISCIPLINES

The methodology of teaching physics is related to the study of the process and laws, the study of the basics of physics, methods of effective assimilation of these basics and the acquisition of practical skills provided by the program. The methodology of physics is a pedagogical science that studies the ways and means of education, its regularities and the ways and means of education and development of students. In the light of the informatization of society, including the education sector, it is mandatory to use innovative technologies in teaching to improve the quality of the lesson and motivate students. At this time, each student confidently uses various gadgets in everyday life, and their learning process gives positive results. The article considers some problems of the subject of the methodology of physics theory and practice of teaching physics, methods of teaching physics.

Keywords: *updated education, subjects of natural science, teaching, methods, approaches, work in small groups, individual work, warm-up, group discussion.*

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ТАБИЯТ ТААНУУ ДИСЦИПЛИНАЛАРЫНДА ОКУТУУНУН ИННОВАЦИЯЛЫК ЫКМАЛАРЫН КОЛДОНУУ

Физиканы окутуу методологиясы процессти жана мыйзамдарды үйрөнүү, физиканын негиздерин изилдөө, бул негиздерди натыйжалуу өздөштүрүү ыкмалары жана программада каралган практикалык көндүмдөргө ээ болуу менен байланышкан. Физика методологиясы - бул тарбия жолун жана каражатын, анын мыйзам ченемдүүлүгүн, жолун жана окуучуларды тарбиялоо жана өнүктүрүү каражаттарын изилдөөчү педагогикалык илим. Коомду, анын ичинде билим берүү чөйрөсүн маалыматташтырууда сабактын сапатын жана окуучулардын мотивациясын жогорулатуу үчүн окутууда инновациялык технологияларды милдеттүү түрдө колдонуу зарыл. Азыркы учурда ар бир окуучу күнүмдүк турмушта ар кандай гаджеттерди ишенимдүү пайдаланат, аларды окутуу процессине тартуу оң натыйжаларды берет. Макалада физиканын методологиясынын предметинин кээ бир проблемалары жана физиканы окутуу практикасы, физиканы окутуу методдору каралган.

Өзөктүч сөздөр: *заманбап билим берүү, табигый илимдер предметтери, окутуу, усулдар, ыкмалар, кичи топтордогу иштөө, жеке жумуш, машыгуу, топтук дискуссия.*

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ИСПОЛЬЗОВАНИЕ ИННОВАЦИОННЫХ МЕТОДОВ ОБУЧЕНИЯ В ДИСЦИПЛИНАХ ЕСТЕСТВОЗНАНИЯ

Методология преподавания физики связана с изучением процессов и законов, изучением основ физики, методов эффективного усвоения этих основ и приобретения практических навыков, предусмотренных программой. Методология физики - это педагогическая наука, исследующая пути и средства воспитания, его закономерности и пути, средства воспитания и развития учащихся. В свете информатизации общества, в том числе сферы образования, является обязательным использование инновационных технологий в обучении для повышения качества урока и мотивации учащихся. В данное время каждый ученик уверенно использует различные гаджеты в повседневной жизни, привлечение их в процесс обучения дает положительные результаты. Статья рассматривает некоторые проблемы предмета методологии физики, теорию и практику преподавания физики, методы преподавания физики.

Ключевые слова: *современное образование, предметы естествознания, преподавание, методы, подходы, работа в малых группах, индивидуальная работа, разминка, групповая дискуссия*

The methodology of teaching physics deals with the study of the process and laws, the study of the basics of physics, methods of effective assimilation of these basics and the acquisition of practical skills provided by the program. The methodology of physics is a pedagogical science that explores the ways and means of education, its regularities and ways and means of education and development of students. The subject of physics methodology is the theory and practice of teaching the basics of physics [1].

Physics at school, a subject that gives students the opportunity to get acquainted with the phenomena of nature, showing and explaining the causes of phenomena, giving a scientific justification for all processes occurring in nature. Physics is the Foundation of modern natural science and the theoretical basis, without which it is impossible to prepare and successful activities of highlyqualified specialists in various fields of production, science and technology. The basis of the modern natural science picture of the world are physical principles and concepts. Formation of students ' modern physical thinking about the physical picture of the world, the creation of the foundations of training for the study of General technical and special disciplines.

The world around us is amazing and beautiful, it holds many secrets and nonordinary phenomena. Every morning the sun rises, giving us warmth and light. Physics at school, a subject that appears in the school curriculum, when children have more clearly formed in the consciousness of the concept of events and phenomena in the world and nature.

What does physical science study? The object of study of physics-science is nature. More precisely, physics is fascinated by the study of the simplest and at the same time the most General laws of nature, properties and structure of matter and the laws of its motion. The main goal is to discover the most General laws, manifested in all phenomena physics belongs to the exact Sciences and is a leader among the natural Sciences. Its concepts, laws, theories, methods and means are used in many areas of science and technology, it is the basis of many areas of scientific and technical progress. Classification of the components of physics-science is carried out on different grounds [2]: by research methods, experimental and theoretical physics. On the studied objects: physics of elementary particles,

physics of a nucleus, physics of atoms and molecules, physics of liquids and gases, physics of a solid body, physics of a plasma.

On the studied forms of motion of matter: mechanics of a material point and a solid body, mechanics of continuous media, thermodynamics and statistical physics, electrodynamics (including optics), theory of gravitation, quantum mechanics and quantum field theory.

A characteristic feature of students in the study of physics is to enable them to realize the importance and universality of the studied laws, to create conditions for the individualization of the personality of each student in the learning process, to develop the need for constant creative and research activities in the framework of physical science, to equip the necessary methodological material:

1. Why to teach – justification of the purpose of teaching physics at school and University.
2. What to teach is the definition and systematic improvement of the content and structure of the physics course.
3. How to teach is the development, experimental testing and implementation of the most effective methods and techniques of teaching, education and development of students, as well as educational equipment for physics classes.

The main branches of physics are studied in schools and vocational schools. It should meet modern requirements and be simple. At present, due to the rapid development of technology and science, the knowledge gained in school should be quite simple, understandable to society. Given the above, the knowledge system of the secondary school course in physics must meet the following requirements:

- 1) to form modern scientific concepts;
- 2) study basic physical laws and theories;
- 3) to understand the physical methods;
- 4) vocational orientation;
- 5) development of students' thinking;
- 6) formation of dialectical-materialistic relations.

The program is the only document that determines the content and scope of the physics course. The program is a document that determines what knowledge students should get and what knowledge teachers should have. Authors who write a book of physics, written in accordance with this program. The program is a state document. You should always follow this document and it will help to get the same education in all schools [4].

Methods of teaching physics.

Common questions that include:

- a) the purpose of studying physics;
- b) structure and content of the physics course;
- c) methods of Polytechnic training;
- g) the connection of teaching physics, with practice;
- e) forms of organization of educational process and extracurricular activity.

Special issue:

- a) methods of separate sections and topics in physics;
- b) methods of practical work;
- c) provision of teaching visibility.

Components of training:

1. The content of training (basic physics).
2. Teaching (activity of the teacher on creation at the pupil of motives of training; activity of the pupil on independent work; Presentation of a material by means of physical experiment and visual technical means of training).
3. Teaching (activities of students including mental and physical operations).

4. Material means of training (problem books, textbooks, technical means of education).

The subject of physics in school education is determined by the importance of physics in the life of modern society, defined as the most important component of civil culture and has a decisive impact on the pace of development of scientific and technological progress.

Physics occupies a special place in the knowledge of nature, philosophy, knowledge of modern technology, as well as in chemistry, biology, geography and astronomy. Therefore, physics is the subject of Polytechnic education in school. For several centuries, physics has used mathematics only to solve its problems, and now the role of computer science is growing electronic technology, which solves a variety of problems of mathematics, using physics. Depending on the close ties with other Sciences, new branches of science develop-astrophysics, Biophysics, Geophysics, Astronautics and others.

Physics for school, along with the study of the world, performs developmental and educational functions. Thus, physics occupies a special place in the high school course (attention, memory and speech).

General questions of methods of teaching physics.

The leading role in the formation and development of psychological characteristics is played by social experience, the condition of life and activity, training and education. He's a lunatic. development are natural features of the person, i.e. the congenital state of the nervous system and the anatomical and physiological state of the brain. The process of self-education plays an important role in the process of development. Abilities are formed and brought up depending on conditions of life and activity, training and education.

Vygotsky suggested that learning precedes development. Learning leads to development, but by stimulating development it affects it. For the assimilation and development of certain forms of thinking, certain time frames are required. Vygotsky and Leontiev called these periods sentimental. For the formation of speech, the sentimental period is 1-5 years, for moral thinking 11-13 years, for mathematical thinking from 15 to 20 years. The psyche of lady plasticity, it is possible to use the method of payment. (For example, if poor vision, then acute hearing).

Characteristics and criteria of mental development:

1. The speed of assimilation of the material (the rate of progress);
2. Economy of thinking;
3. Level of analytical and synthetic activity;
4. Transfer of techniques of mental activity formed on one object to another object;
5. Ability to systematize and generalize independently.

Psychological features of teaching physics:

1. Abstraction and the construction of ideal models;
2. Models and symbols (formulas and graphs) are used. Students are required to make the transition from real objects to iconic;
3. Emotionality.
- 3.1. Structure of physical knowledge.

There are two levels: an empirical and theoretical.

These two things include the data of experience, an empirical concepts, laws and regularities. studying the physical phenomena, forms a set of experiments, then analyzes it, describes, and on the basis of this form the laws and laws. For the quantitative assessment of physical phenomena, numerical characteristics of the measure of their properties are introduced, which are called physical quantities. A physical quantity is a numerical characteristic of the properties of physical objects obtained by measurement. A physical object is a body, system, States of this system or processes that occur in it.

Each physical quantity characterizes a physical object not only quantitatively but also

qualitatively. A physical quantity is not reality itself - it is a way of describing physical reality accepted in physics. Each physical object has many properties that use the method of idealization: highlight the essential sides and discard the non-essential, and then study a simplified model (material point, mathematical pendulum, absolutely solid).

The theoretical level includes theories, ideas, and hypotheses. Physical theory is the theoretical laws presented in the form of mathematical equations that describe these phenomena.

Theoretical laws are more General, they include theoretical concepts and Imperial concepts. Theoretical concepts are more distant from the experimental ones.

The physical theory distinguishes structural parts: the Basis, a kernel, a consequence.

The basis includes an Imperial basis (a set of experimental data), an idealized object and physical quantities. An idealized object is a model of matter at a certain structural level. Each theory is distinguished from the other by an idealized object.

For example: in electrodynamics. The object is an electric gas, and in quantum electrodynamics it is a harmonic oscillator.

The ideal object serves as a transitional bridge from the Imperial basis to the new theory.

The core of the physical theory is a system of General laws expressed in mathematical equations, postulates and principles.

The system of equations is a mathematical model of this type of interaction of matter, in which the idealized object is represented in dynamics and motion.

The fundamental equations include the fundamental constants: Planck, Boltzmann.

A special kind of physical conservation laws are conservation laws; their number is growing.

Each physical theory corresponds to a set of principles of symmetry, which manifest themselves in the immutability of physical laws under certain transformations (operations). For example, there are continuous transformations: the transfer or rotation of the system as a whole; discrete transformations: the replacement of particles by antiparticles. An important role is played by the correspondence principle, which means that new theories are asymptotically transferred to the old ones if the fundamental constants acquire critical values $(0, 1, \mu)$.

Conclusions are built by logical deduction. The set of basic ideas, principles and hypotheses creates a physical picture of the world.

Motivation of teaching and formation of cognitive interest in physics.

Under the explanation in psychology, understand motives, actions, and progress-ing. The formation of motives is influenced by: need, instincts, emotions, feelings, attitudes and ideals.

The explanation of the doctrine:

1. Setting parents;
2. The desire to be no worse than others;
3. The desire to get a certificate;
4. The desire to enter the Institute.

Social motives: to serve the public good.

Spiritual: knowledge to know the truth.

Cognitive interest determines a positive attitude to the subject and helps to form an independent creative activity. If interest is not formed, the information passes through the brain without a trace, does not cause positive emotions, but causes complete indifference.

Reasons for interest:

1. Interesting presentation of the material;
 2. Like the teacher;
 3. Likes action (7 class);
 4. Knowledge will be useful in everyday life.
- 3.3. Knowledge of physics will be useful for admission reasons of lack of interest:

1. Complex presentation of the material in the textbook;
2. Excessive matematicheski material;
3. Monotonous demonstrations (balls and carts);
4. Uninteresting presentation of the material by the teacher;
5. Lack of connection between theory and practice;
6. Problems of knowledge in previous years.

Output: problem-solving training, arrange a project competition, essay copetition, technical modeling and design.

3.4. Formation of skills and abilities in educational work.

Distinguish between intellectual abilities:

- ability to analyze;
- ability to abstract;
- compare;
- synthesize practical skills;
- measure;
- calculate;
- collect scheme, etc.

Cognitive skills:

- ability to acquire knowledge independently;
- ability to work with a book;
- the ability to observe (choose the object, purpose, the best way to observe, draw conclusions).

The experiment includes observation, measurement, calculation, graphical construction.

Organizational – the ability to plan your work, organize your place, to exercise self-control over the quality of work.

Psychologists (Halperin) allocate 3 types of the indicative basis of action and accordingly 3 types of orientation of tasks.

1 indicative task *type*: there is a sample of the action and its final product. Students go through trial and error. The task is executed, but the action remains forfeit.

Type 2: provides a sample action and all instructions for the new job.

Type 3: teaching students to analyze new tasks in a way that allows them to identify reference points and conditions for the correct execution of the task.

Studies have shown that the most effective training is based on the gradual formation of skills.

For example according to this scheme:

1. Perform tasks on the model. Students are given a complete algorithm for solving the problem.

2. Reconstructive - a variety of tasks. The task is slightly changed, but students use the knowledge gained when performing tasks on the model.

3. Partly-search task. Students are faced with the problem of solving some parts of the tasks on their own.

4. Creative task. Complete independence in the choice of methods and means of completing the task. The purpose of these tasks is to discover either new knowledge that the student did not know before, or discoveries of world development.

Teaching methods are ways of activity of the teacher and pupils in their interconnected, joint work directed on achievement of abilities of training. Conversation, explanation, story, lecture, demonstration of experiments, illustration, TV show, video, educational films, students' work with literature: textbook, reference book, manual; laboratory experiments, observation of life, problem solving, work with handouts, frontal and individual survey, written independent and

control work, program (test) control [5].

The methods are classified by:

I. The Method of transmitting information from teacher to student:

1. Verbal (verbal) – conversation, lecture, story. Work with literature.
2. Visual-demonstrations, models, posters.
3. Practical – problem solving and laboratory experiments.

II. On the main didactic tasks:

1. Method of acquiring knowledge.
2. A method of forming skills.
3. Method of application of knowledge.
4. Method of creative activity.

5. Method of consolidation and control of knowledge, skills and abilities. Skill is an automated skill.

III. By the nature of cognitive activity:

1. Explanatory and illustrative.
2. Heuristic.
3. Reproductive.
4. Research.
5. Problem statement.

IV. The Technique Of Yuri Babanskii:

1. Method of organization and implementation of cognitive activity.
2. Method of stimulation and motivation.
3. Methods of control and self-control in the effectiveness of educational and cognitive

activity.

V. The modern school uses the classification of the means of education used:

1. Verbal.
2. Ddemo.
3. Laboratory.
4. Working with a book.
5. Solve problems.
6. Ilustrative.
7. Knowledge accounting and control.

VI. If the basis is the method of the studied science, then theoretical and experimental methods:

1. Verbal methods.

2. Specific features is that along with the presentation of the material should be used drawings, graphs, and analysis of the results.

3. F Conversation. It is used in the first stage of physics teaching.

Included:

- message of new knowledge;
- consolidation of knowledge;
- deepening knowledge;
- discussion of the results of laboratory work and experiments;
- checking homework and knowledge of students;
- the best way is heuristic conversation;

The conversation plan includes:

1. Make a group of questions that are connected by a single logic and consistency.
2. List the experiences and demonstrations and indicate their place during the lesson.

3. List the entries, drawings that need to be done on the Board and that should be entered in the notebook by students.

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