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APPLICATION OF DIDACTIC PRINCIPLES IN TEACHING PHYSICS: UNITY OF THEORY AND PRACTICE

Turabova Lobar Khusen kizi
The doctoral student of National Institute of Pedagogics and Character education named after Kori Niyoziy

Abstract: This article reveals the importance of didactic principles in organizing physics lessons, their role in ensuring the unity of theoretical knowledge and practical activities. On the example of the topics of the 7th grade physics course, ways of effectively applying the basic didactic principles in the educational process are shown.
Key words: teaching physics, didactic principles, theory, practice, 7th grade, educational process, active teaching methods.
Аннотация: В данной статье раскрывается значение дидактических принципов при организации уроков физики, их роль в обеспечении единства теоретических знаний и практической деятельности. На примере тем курса физики 7 класса показаны пути эффективного применения основных дидактических принципов в учебном процессе.
Ключевые слова: обучение физике, дидактические принципы, теория, практика, 7 класс, учебный процесс, активные методы обучения.

INTRODUCTION

One of the most important conditions for improving the quality of education is the organization of the educational process based on scientifically based approaches, taking into account both theory and practice. This is especially true in the teaching of physics - a natural science subject that forms not only theoretical knowledge, but also observation, the ability to experiment and think logically. This requires the mandatory application of didactic principles.

THEORETICAL BACKGROUND

The principle of unity of theory and practice goes back to the ideas of Y.A. Komensky, K.D. Ushinsky, as well as domestic teachers of the XX century (V.V. Davydov, A.M. Pyshkalo). According to Vygotsky, training should be ahead of development and built in the zone of the student's closest development, which is possible only with the active involvement of the student in practical activities. In physics, this means a constant reliance on experience, observation, experiment, modeling.

The role of didactic principles in the learning process

Didactic principles are scientifically based general principles on which the learning process is based, which determine the content, forms and methods of teaching. In teaching physics, the basic didactic principles are:

1. Principle of scientific
2. Consistency and consistency
3. The principle of activity and independence of students
4. How learning relates to life
5. Principle of visibility
6. Principle of unity of theory and practice

Application of didactic principles using examples from the 7th grade physics course

1. The principle of scientific and systematic

For example, when studying the topic "Substance and its properties," students gradually, from simple to complex, explain scientific concepts - the structure of matter, aggregate states.

Scientifically based examples are given, such as water evaporation associated with the movement of molecules.

2. Principle of visibility

Physics is a visual science. When studying the topic "Volume and Density," real objects (for example, pieces of iron and wood) are used to show the difference in density. In laboratory work, students independently measure the density of bodies, which makes knowledge tangible and understandable.

3. Principle of activity and independence

Lessons are accompanied by questions and problem situations that encourage students to think.

An example of the question: "Why does iron sink in water, but wood does not?"

This approach develops analytical thinking and the ability to draw conclusions.

4. Principle of unity of theory and practice

Each theoretical knowledge is supported by practical tasks. For example, in the topic "Force," students measure force using a dynamometer. Thus, "force" becomes not only a theoretical concept, but also a value measured in experiments.

Forms of implementation of the principle in physics lessons

Laboratory and practical work

Conducting experiments is the basis of a practical approach in physics. Working with measuring instruments, setting up experiments and interpreting the results ensure the consolidation of theoretical knowledge and the formation of research skills.

Solving applied problems

Examples of tasks related to real life situations (energy saving, traffic, mechanisms) stimulate the application of theory to everyday phenomena.

Design and research activities

Project tasks aimed at creating models, conducting mini-research, participating in competitions and scientific conferences develop students' independence, creativity and interest in physics.

Using digital technology

Modern digital laboratories, simulators (PhET, Labster), Arduino projects make it possible to conduct experiments in a virtual environment and simulate complex processes, which is especially important when there is a shortage of equipment.

Cross-subject integration

The connection of physics with computer science, mathematics, chemistry, biology and technology allows students to demonstrate the practical applicability of physics and contributes to the formation of a holistic scientific view of the world.

5. The principle of connection with life

Connecting with everyday life helps students better understand physical phenomena.

Example of the task: "Why does the passenger continue to move forward when the car stops abruptly?"

This is due to inertia, which is explained within the framework of the topic under study.

Implementation challenges and how to overcome them

Among the main difficulties teachers call:

- ➢ limited material and technical resources;
- ➢ lack of study time;
- ➢ lack of teaching materials and digital resources;
- ➢ lack of systematic training of teachers in the field of STEM education.

Possible solutions include:

- ✓ attracting schoolchildren to participate in scientific and technical competitions;
- ✓ using virtual laboratories and free simulators;
- ✓ networking between schools and educators to share experiences;
- ✓ Incorporating elements of project activities into standard lessons.

CONCLUSION

The principle of unity of theory and practice is the most important tool for increasing the efficiency of teaching physics. Its systemic application allows you to make the educational process not only more interesting and visual, but also productive. In modern conditions, its implementation requires updating the teacher's methodological tools, active use of digital and research technologies, as well as integrating practice into each stage of studying new material. This is the only way to educate a student who can apply scientific knowledge in real life and make informed decisions in a rapidly changing world.

Effective organization of the educational process in physics is impossible without the use of didactic principles. Especially in the 7th grade, it is important to explain theoretical concepts based on practice and real life examples. The use of visibility, active forms of learning, laboratory work and tasks from everyday life makes the process of assimilating knowledge deeper and more interesting for students.

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