MODERN PEDAGOGICAL TECHNOLOGIES OF TEACHING PHYSICS IN SECONDARY SCHOOL

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ABSTRACT

The article discusses the features of the organization of the process of teaching physics in secondary school. The advantages of using new pedagogical technologies, a complex of electronic means for educational purposes are reflected. An example of educational technology for teaching physics is given.

Keywords: Pedagogical technologies, electronic teaching aids, innovative teaching methods.

INTRODUCTION

There are different interpretations in the definitions of educational technology. I will give examples of some of them:

1. Technology is a set of methods and techniques used in work, skill, art. (Glossary)
2. Pedagogical technology is a project of the process of forming a student's personality, which can guarantee pedagogical success regardless of the teacher's qualifications. (Bespalko V.P.)
3. Pedagogical technology - details of the process of achieving planned learning outcomes. (I.P. Volkov.)
4. Pedagogical technology is a systematic method of creating, applying and identifying all teaching and learning processes, aimed at optimizing the forms of learning, taking into account technical resources, people and their interactions (UNESCO).
5. Pedagogical technology is a unique (innovative) approach to teaching. This is an expression of social engineering thinking in pedagogy, an image of technocratic scientific consciousness transferred to the sphere of pedagogy, a certain standardization of the educational process. (B.L. Farberman.)
6. The consistent practical activity of students and teachers in the educational process, leading to the formation of predetermined qualities, can be regarded as a pedagogical technology. (Yu.G. Yuldashev, S. Usmanov).

Based on the analysis of the above definitions, it can be concluded that the essence of modern pedagogical technology is to clearly define the goals and objectives of a highly effective organization of training, to fix the learning outcomes in advance, to achieve complete mastery of subjects. preparation of the necessary educational means, conditions, development of a system of necessary measures aimed at achieving a pre-recorded, clearly guaranteed result and the organization of the educational process in accordance with it.

MATERIALS AND METHODS

The pedagogical technologies are classified according to the following criteria:

- by the level of application (general pedagogical);
- on a philosophical basis (compulsory pedagogy - compulsory education);
- on the main factor of development (sociogenic, that is, the main emphasis is on the development of harmoniously developed people who are active members of society; at the

same time, with an emphasis on biogenic factors, that is, on the full development of the personality.);

- about the concept of mastery (associative-reflexive);
- focused on personal characteristics (informative, i.e. aimed at the formation and consolidation of knowledge, abilities, skills);
- content (secular, technocratic, general, central to the organization and conduct of the educational process, didactics);
- by the type of management (traditional-classical, with the addition of technical teaching aids);
- approach to the student (authoritarian);
- The most frequently used methods (explanatory and illustrative);
- by category of students (public).

The technology is universal and can be implemented by any specialist at the same level and for the same purpose. The main difference from the methodology is that the methodology is a set of methods and teaching methods that are convenient for a particular person. The method depends on the knowledge, skills, abilities, personal qualities and temperament of the teacher.

The main technology criteria can be defined as follows:

1. Reling on a certain scientific basis, concept.
2. Systematization, logical process of the educational process and its components.
3. Efficiency, guarantee of achievement of educational standards, the required level of time, effort and resources.
4. Possibility of repetition by others.

In order to create a technological learning process that gives a guaranteed result, all the tasks that a student must perform until he masters it, a detailed program is created in a clear sequence. The program must ensure that each student acquires a level of knowledge and skills designed for educational purposes. The teacher and the student are informed about the progress of the educational process. With almost no mistakes, the student can achieve the main goal by completing a series of logically related short assignments. This technology allows you to fully control the learning process. In this case, a logically connected short sequence of tasks creates an algorithm for the learning process. The organization of the activities of students and teachers on the basis of such an algorithm guarantees the achievement of the set goal. Such organization of the educational process can be called a full-fledged pedagogical technology.

Based on the foregoing, it is recommended to design the pedagogical process in the following sequence:

- analysis of educational standards;
- compare educational standards with the curriculum based on them and determine how the curriculum is aimed at meeting the requirements of the standard;
- Determining the purpose of the subject;
- highlighting the training elements in the curriculum that must be mastered according to the STS;
- setting goals for each element of learning;
- the optimal choice of teaching tools;
- to determine the didactic process and determine the ways of conveying the content of the teaching elements to the students on the basis of didactic principles (continuity, consistency, comprehensibility, scientific nature, clarity) for the timely achievement of the educational goal;
- to determine the methodology and criteria for assessing student performance;
- Analysis of learning outcomes: comparison of student performance with the goals set for the student in the learning process.

An example of this is a 6th grade lesson about Archimedes' law and its application.

I. Educational objectives of the lesson 1. Transfer of knowledge: a) Study of Archimedes' law b) Study the concept of repulsive force in liquids and gases. c) Repetition of the concepts "density", "hydrostatic pressure". 2. Develop skills a) Develop the ability to work with dynamometers, beakers. 3. Professional development a) Improving the skills of conducting simple experiments.
II. Educational objectives of the lesson 1. Teaching teamwork 2. Satisfaction and self-confidence from the right experience. 3. Feeling the importance of the laws of physics.
III. Developmental goals of the course. 1. Learning to compare 2. Learning to draw conclusions 3. Learning to assess your knowledge
IV. Course teaching tools: dynamometers, water bottles. salt, objects made of various substances, raw and boiled eggs, Archimedes' bucket, posters “Submarines” and “Salvation of sunken ships”.
The Lesson methods: "Intellectual", "Group training", "Experiment".
V. Lesson plan: VI. 1. Organizational part - 2 minutes. VII. 2. "Atmospheric pressure", "Torricelli's experiment". VIII. Repetition and interrogation according to the "intellectual" method - 10 minutes. IX. 3. Completion of assignments in groups on a new topic - 10 minutes. X. 4. Report of groups on assignments, hearing conclusions - 7 minutes. XI. 5. Summarize the new topic - 10 minutes. XII. 6. Assessment of students' knowledge - 1 minute. XIII. 7. Reinforce the new topic - 4 minutes. 8. Homework - 1 minute.
VII. Teaching methods: Interactive methods - division of groups into groups, methods of students' independent work.

Currently, due to the lack of a clear understanding of pedagogical technology, it is practically equated with specific methods. In fact, there are significant differences between them. This was discussed above.

There are many obstacles to studying physics. We are talking about overcoming the patterns and habits associated with outdated textbooks for the general physics course, about the need to improve the qualifications of teachers, about expanding the cognitive capabilities of students and deepening their knowledge, about overcoming difficulties in their assimilation of the concepts and laws of modern physics. Unfortunately, sometimes schoolchildren have difficulty in assimilating many complex physical concepts and phenomena. But these difficulties indicate that the modern structure of the lesson and the teaching methods used do not provide the necessary mental activity of students. Therefore, it is necessary to look for ways of a qualitatively better organization of the educational process and more effective methods of teaching physics. It is necessary to activate the cognitive activity of schoolchildren in the classroom, to create conditions under which the student would not only listen and think, but also do something, translate thoughts into deeds. It is necessary to involve students in the classroom to work on a textbook, to perform frontal physical experiments, to solve creative tasks, qualitative and numerical problems. Thus, the main reserve in improving the quality of

education is to improve the methods of conducting classes. But at the same time, do not forget to correlate with each other:

- motives of learning activities and awakening interest in the material being taught;
- clear understanding by the student and the teacher of the tasks and requirements for the learning outcomes for the development of competencies;
- disclosing the content of the lesson in accordance with the methodological concept, equipping students with the methods of science, general approaches to the studied material, taking into account the tendencies of the development of physics;
- systematization and generalization of educational material, consolidating it through exercises and independent work with a textbook or synopsis;
- checking and assessing knowledge, as well as the level of educational activity of schoolchildren in the lesson [3].

All this provides the use of interactive learning tools. For example, libraries of electronic visualizations provide the ability to visualize complex physical phenomena and processes, their internal structure and features of their course. The didactic value of means of this type is determined by their capabilities in the formation of complex skills of students to describe and analyze physical phenomena, processes and laws, to draw generalizations and conclusions. The use of libraries of electronic visualization acquires particular relevance when explaining physical phenomena that are difficult to recreate in a school physics laboratory, as well as in conditions of insufficient equipment in a school physics classroom.

Virtual physics laboratories are designed to improve the methodology for the formation of practical and experimental skills and abilities of students of a comprehensive school in physics. The virtual laboratory includes separate subsystems: computer laboratory work, video support of the process of performing laboratory work in a school physics laboratory, an information subsystem, a “gallery of devices” subsystem, a subsystem for consolidating knowledge and skills.

Thus, the use of a complex of electronic educational tools makes it possible to:

- sequential or selective study of theoretical material;
- consolidation of educational material, which is studied by traditional methods;
- study of complex physical phenomena and processes using computer simulation;
- consolidation of the studied material using a specially developed test system;
- performing virtual laboratory work;
- preparation for the implementation of real laboratory work in school laboratories;
- obtaining reference information (work with electronic libraries);
- organization of group and individual work of students;
- the use of individual illustrative materials, video clips and models during traditional lessons by projecting them onto the screen of a digital projector, TV, or computer monitor;
- creating original (author's) lessons using the lesson constructor;
- organization of self-examination and verification of the level of mastering of educational material;
- teaching the solution of physical problems and checking the formation of the corresponding practical skills and abilities.

Experiments are especially interesting Tof G.N. Zainasheva and S.F. Malatsion, who developed educational technology for teaching physics. The conceptual basis of the proposed author's technology is a competent approach to learning, which involves the formation of general educational skills and abilities, universal methods of activity and key competencies.

The content of the technology is the content of the program in general physics and the goals: mastering knowledge in physics as a basis for professional knowledge; mastering skills; application of knowledge to explain natural phenomena; development of cognitive interests and creativity; education and development of the student's personality as a future representative of the technical intelligentsia; using the acquired knowledge and skills to solve practical problems, etc.

The organization of the educational process includes: lectures, practical exercises in problem solving and laboratory exercises. The teaching method is based on the theory of reflection: in knowledge, students see an objective reflection of the external world; cognition of both objects and phenomena of the external world is carried out by revealing their connections and development; the assimilation of laws and theories is combined with active practical activity, the acquisition of practical skills and abilities, as well as their application. Methods and forms of the teacher's work: problem-research presentation of lecture material with the active participation of students, their systematic work on homework for lectures, lectures - discussions, solving physical problems of various levels of complexity, multilevel training in practical classes, control testing at the beginning and end of the studied sections of the course, the use of information technology. The presented pedagogical technology can be used when conducting lectures, practical and laboratory classes for schoolchildren, which will contribute to the formation of general educational and professional competencies in future specialists [1].

CONCLUSION

Thus, the identification of the conditions for innovative learning allows us to determine the mechanism for the formation of an information and educational environment that ensures high efficiency of the results of educational activities. An important trend in innovative teaching physics is the acquaintance of students with the methods of obtaining scientific knowledge, with the methodology of mathematical modeling, the features of the integration of science and education, the inclusion of all students in the active process of formation of knowledge and generalized ways of activity due to the skillful creation and management of the emotional field, with the maximum use of reserves internal motivation of students.

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