INNOVATIVE TECHNOLOGIES FOR TEACHING PHYSICS

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Abstract. *This article discusses ways to use innovative methods in physics lessons.*
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INTRODUCTION

The task of modern education is not just to communicate knowledge or to turn knowledge into a tool for creative exploration of the world. The requirements for the preservation and development of the student's personal qualities, the development of his creative potential, and value orientations come to the fore.

The results of psychological and pedagogical research show that new knowledge of students can be formed both in an additive way and through revision of previous knowledge, posing new questions, and hypotheses. In this case, the students' knowledge is instrumental and will be in demand in the student's life to explain the processes and phenomena surrounding him. The question of how to purposefully develop a student's intellect, creative thinking, form a scientific worldview, and an active life position by special pedagogical means remains open. This is the number one problem of modern innovative searches.

Innovative processes are natural in the development of modern education. Their emergence occurred on the basis of searches by teachers and methodologists within the framework of traditional education. The data of comparative pedagogical studies show that, despite the differences in school systems and the content of curricula, general ideas about the traditional educational process in different countries of the world have similar features, therefore, common trends can be traced in innovative searches. In innovative processes, the goal of learning is to develop students' opportunities to master new experiences based on the formation of creative and critical thinking, to provide conditions for such development that would allow everyone to reveal and fully realize their potential: physical, spiritual and intellectual.

RESEARCH METHOD AND METHODOLOGY

The use of an integrated system of innovative teaching in physics lessons of ITTF (innovative technologies for teaching physics) is impossible without knowledge of the general mechanisms of this training, research of the possibilities of their functioning in the study of different sections of the school curriculum in physics. Identifying the conditions of innovative learning allows us to uncover the mechanism and develop the technology of processes that ensure high efficiency of learning outcomes. The activities of scientists, innovative teachers and the modern development of physical education that causes it have exposed a number of serious contradictions that negatively affect the qualitative level of assimilation of physical laws.

Innovations in education are understood as the process of improving pedagogical technologies, a set of methods, techniques and teaching tools. Currently, innovative pedagogical activity is one of the essential components of the educational activity of any educational institution. And this is no coincidence. It is innovative activity that not only creates the basis for creating the competitive ability of an institution in the educational services market, but also determines the

directions of professional growth of a teacher, his creative search, and really contributes to the personal growth of pupils. Therefore, innovative activity is inextricably linked with the scientific and methodological activities of teachers and educational and research students.

As a result of the search, ways have been outlined to transfer physics education to a new qualitative level: creating conditions for the inclusion of all students in the active process of knowledge formation and generalized ways of activity through the skillful creation and management of the emotional field created in the physics lesson, while maximizing the reserves of internal motivation of students, which gives the learning process a voluntary character. The basis for the transition to personality-oriented learning in modern conditions can be innovative physics teaching technologies (ITTF) aimed at developing the child's personality not as a by-product of learning, but requiring a focus on personal development.

Despite the vastness of the methodological literature on innovations in education, it should be noted that in most cases the problems are only stated in terms of the importance of their solution. The lack of sound methods for organizing creative educational and cognitive activities of a student in physics lessons, the scarcity of pedagogical arsenal in the use of research and discussion learning technologies in solving various didactic tasks of the lesson - all this can be considered an important order of the practice of teaching physics teaching methods as a science.

THE RESULTS OF THE STUDY

The use of innovative technologies becomes relevant in the pedagogical process, which form the skills of students to independently acquire new knowledge, collect and analyze necessary information, the ability to put forward hypotheses, draw conclusions and draw conclusions. These technologies involve fundamentally new ways, methods of interaction between teachers and students, ensuring effective achievement of the result of pedagogical activity and are based on a system-activity approach, implement developmental learning, exclude ineffective verbal methods of knowledge transfer, motivate teacher-student interactions that guarantee educational results.

The teacher currently faces the problem of teaching a child such technologies of cognitive activity, the ability to master new knowledge in any form and types so that he can quickly and, most importantly, process the information he receives efficiently, apply it in practice when solving various types of tasks (and assignments), feel personal responsibility and involvement in the learning process, prepare yourself for further practical work and continuing education.

There are several reasons that lead to a loss of interest in mastering new knowledge, to mastering the technology of cognitive activity (and as a result, a loss of interest in the subject):

- the use of traditional learning designed to increase the information flow with limited time, which does not allow students to fully unleash their creative potential.

- the elements of research are not fully applied, as an essential component in teaching physics, in laboratory and practical work: due to the insufficiency of equipment or the simplification of the experimental model itself, the cost of a large amount of time by students to calculate the desired values and measurement errors, the impossibility of repeated repetition of the experiment with different parameters, etc.;

- a formal approach to solving physical problems (solving them only on paper and the inability to verify the result in practice); - poor availability of demonstration equipment due to insufficient funding;

- the impossibility of showing some physical experiments in school conditions, due to their expensive cost or high danger, etc.;

Consider two main problems in teaching physics:

1) Many phenomena in the conditions of a school physics room cannot be demonstrated. For example, these are phenomena of the microcosm, either fast-moving processes, or experiments with devices that are not in the office. As a result, students experience a number of difficulties in studying them, as they are unable to mentally imagine them. A computer can not only create a model of such phenomena, but also allows you to change the conditions of the process, "scroll" with the optimal presentation of educational material for assimilation.

2) Physics is an experimental science. It is difficult to imagine studying physics without laboratory work. Unfortunately, the equipment of the physical room does not always allow for complex laboratory work, it does not allow at all to introduce research work requiring more sophisticated modern equipment. ICT comes to the rescue, which allow for fairly complex laboratory work. In them, the student can, at his discretion, change the initial parameters of the experiments, observe how the phenomenon itself changes as a result, analyze what he saw, and draw appropriate conclusions.

New information technologies turn learning into an exciting process, contribute to the development of students' research skills and encourage teachers to master research design techniques. ITFs allow you to individualize the learning process, activate the activities of difficult students in preparing and conducting a lesson. The use of ICT in physics lessons can increase interest in the study of the subject, expand the possibilities of demonstrating experiments through the use of virtual images.

ITTF training tools allow you to organically combine information and communication, personality–oriented technologies with methods of creative and search activity. The use of ICT in the classroom allows the teacher to reduce the time to study the material due to the clarity and speed of work, check the knowledge of students in an interactive mode, which increases the effectiveness of learning, helps to realize the full potential of the personality – cognitive, moral, creative, communicative and aesthetic, promotes the development of intelligence, information culture of students.

ICTs are used for different purposes and at different stages of the lesson:

1. illustrative, visual explanation of the material;
2. independent learning with denial of the teacher's activity;
3. self-study with the help of a teacher-consultant;
4. partial replacement (fragmentary, selective use of additional material);
5. the use of training (training) programs;
6. use of diagnostic and control materials;
7. doing independent and creative homework;
8. using a computer for calculations, charting;
9. using programs that simulate experiments and laboratory work;
10. using gaming and entertainment programs;
11. use of information and reference systems;
12. organization of students' project activities;
13. distance learning.

Computer models (CM) are one of the new types of educational facilities that have enriched the system of teaching tools in a modern school. Since its inception, KM has very quickly become part of almost all digital educational resources in physics. Educational computer models based on

high-quality physical and mathematical models of real objects and processes as a new means of visualization are incomparable in efficiency with any other digital object.

The use of material or materialized models of real objects has always been considered a very appropriate teaching technique, since it provides a deeper assimilation of the main thing in the phenomenon. KM is no exception in this sense. The advantages of computer models are quite obvious.

Computer models allow you to:

• to study physical phenomena and technical objects at a level accessible to understanding, excluding recourse to the often cumbersome description of many details and analysis of complex mathematical calculations; to focus, thanks to the simplified form of presentation of the phenomenon and multimedia effects, attention on the main (essential) in its content;

• to study the phenomenon in its "pure" form, accurately reproducing the required conditions of its occurrence;

• observe the phenomenon in dynamics (i.e., record its development in space and time);

• accompany the work of the model with a visual interpretation of the regular relationships between the parameters of the system under study in the form of dynamic graphs, diagrams, diagrams, etc.;

• perform operations that are impossible in reality, in particular: change the spatial and temporal scales of the phenomenon; set and change the parameters of the system of objects under study, without fear for its condition, as well as safety and preservation of the environment.

Focusing on generalized plans when organizing students' work with KM is fundamentally important, because it allows students to extract the most complete educational information embedded in them by the author. Working with such instructions in a fairly short time leads to the formation of students' common approaches to the study (research) of KM and the formation of generalized skills. It is important to purposefully develop students' ability to independently build an answer based on a text that includes KM on the basis of appropriate generalized plans, and reproduce the most important stages of the work of models in the form of drawings in the course of the answer.

The use of information and communication technologies, provided that their didactic role and place in the lesson are correctly determined, the optimality and expediency of application are assessed, arouses real interest among students, motivates students, involves everyone in the work, allows for more efficient use of lesson time, quickly establish feedback with students, overcome the subjectivity of grading. Information technologies increase the informativeness of the lesson, the effectiveness of teaching, give the lesson dynamism and expressiveness. But with the "mechanistic" computerization of the physics lesson, one should be wary of replacing physical reality in its various educational manifestations with the pseudo-reality of computer models and analogies, and the destruction of the collective nature of class activity.

DISCUSSION

The result of the work is a deeper understanding by students of the essence of physical phenomena, the ability to independently pose a problem and find ways to solve it, put forward hypotheses and test them experimentally. The use of modern ICT in physics lessons reveals new learning opportunities, allows students to develop their creative abilities, activate cognitive activity and increase motivation to learn, and determines the prospects for the development of their personality, strategies for future adulthood.

The greatest pedagogical effect is achieved when the teacher selects the really necessary and methodically sustained teaching staff (software and pedagogical tools) ITFs that allow students to better assimilate and understand the educational material, as well as choose an individual educational route.

When working regularly with a computer course, it makes sense to make computer lab work out of invented tasks, in which questions and tasks are arranged as their complexity increases. This activity is quite time-consuming, but it is such work that gives the greatest educational effect.

CONCLUSION

The latest ITTF information technologies in education make it possible to actively use the scientific and educational potential of leading universities and institutes, attract the best teachers to create distance learning courses, and expand the audience of students.

The use of ITF will significantly affect the quality of knowledge and methodological competence of students, will stimulate the development of their creative and intellectual abilities if technologies corresponding to the principle of innovation are diagnostically identified; these technologies are used in the lesson in accordance with the content of the educational material and the objectives of the lesson.

Innovativeness as the most important principle of didactics confirms the objective possibility and necessity of using innovative teaching technologies in physics lessons to implement a personality-oriented approach to learning.

Innovative technologies for teaching physics (research, gaming, discussion, etc.) should include such types of student activities that are characterized by their subjective position in the lesson, since the activity of students in the lesson is determined not only by the content and structure of physical knowledge, but also by their individual needs and interests. The methodology of using innovative physics teaching technologies will be effective if they ensure the full inclusion of students in cognitive activity in the lesson, involving independent receipt and analysis of results, a dialog form of organizing search activities, a positive emotional attitude of students to the content of the lesson and their orientation towards achieving success in educational activities.

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