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INNOVATIVE EDUCATIONAL OPPORTUNITIES IN TEACHING PHYSICS IN HIGHER TECHNICAL EDUCATION INSTITUTIONS

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Abstract. *The article contains new ideas about the scientific-theoretical principles of introducing innovative technologies in the teaching of physics in higher technical educational institutions, their specific features, the development of a teaching-methodical support program for teachers in organizing physics lessons in accordance with the characteristics of technical education, and the competence approach in training future specialists. reported.*
Keywords: *higher technical educational institution, teaching of physics, innovative technology, professional training of the future specialist, competence, interactive education.*

INTRODUCTION. It is known that in the labor market of modern vocational education, the need to train a competent, competitive, responsible, able to work effectively in his specialty, ready for constant professional growth, a qualified employee of the appropriate level and profile, requires a radical change in the strategy and tactics of teaching in higher technical educational institutions.

The transition to a special innovative method of educational development depends on the newest methods of interaction between teachers and students, which ensure effective achievement of activity results. The success of achieving this goal depends not only on the content of education, but also on how it is learned. It is possible to create conditions for the promotion of self-development, which involves the transition from the implementation of the educational process using various innovative technologies to the comprehensive provision of the necessary opportunities for the student as a developing person. As a result, the student becomes not only an object of education, but also a person capable of revealing his inner potential in the process of mastering the specialty**.**

MAIN PART. Various classifications of innovative technologies and active learning methods are described in methodological literature [1,2]. In his professional activity, the teacher uses a group of methods that help him achieve the didactic goals he sets for the classes. Given the low interest of students in natural sciences, especially physics, and the difficulty of learning it, the problem of training future physics teachers is extremely urgent. That's why teachers of higher educational institutions of pedagogy set themselves the goal of building the educational process in such a way as to create conditions for stimulating the student's educational activity, to provide the necessary opportunities for the realization of the student as a person, to provide him with effective professional training. One way to solve this problem is to use active learning methods.

In the process of teaching the general course of physics, theoretical physics and physics teaching methodology, the author of the article collected enough experimental materials on the use of innovative technologies and active teaching methods. We used innovative teaching methods with and without imitation, which accounted for about 30% of the total time allocated to mastering each subject. At the beginning of the study of the general physics course, an analysis of their knowledge activity was conducted based on interviews and questionnaires, taking into account the relevant criteria. The average data for the last three years is as follows:

interest in science - 20%;

independence and initiative - 19.7%;

task completion rate - 9.7%;

active participation in classes - 25%;

questions to the teacher on the topic of the lesson - 9.3%;

mutual aid – 12.3%;

class attendance - 85%

Based on the study of indicators of student activity, we have chosen such educational technologies that allow to develop not only reproductive and interpretative activity, but also creative activity, contribute to the possibility of increasing students' interest in science. At the initial stage of the physics course, the module-block method of teaching became one of the leading places. This technology allowed us to change the organizational basis of the educational process in a way that provides conditions for individualization and differentiation of learning[2]. The advantage of using this technology was to encourage the independent work of students, to provide the opportunity to determine the individual pace of learning the learning material, to ensure the freedom to choose the forms of learning information, which is very important in the formation of the student body. Thus, in mastering the "Mechanics" section, the entire educational material is divided into six mini-modules:

material point kinematics,

dynamics of translational movement,

rotational movement dynamics,

conservation laws,

fluid mechanics,

mechanical vibrations and waves.

For each module, the teacher showed an indicative part (goals, resources), a meaningful part, an additional part, a reflective part (self-evaluation of the results of working with the educational material). Various imitative and non-imitative forms of educational organization to engage students in active cognitive activities for mastering each module, in particular, non-traditional forms of lectures [3]:

• problematic lectures that provide creative mastery. the principles and laws of the studied module activate the educational and cognitive activity of students, their independent classroom and extracurricular work, stimulate learning and practical application of knowledge;

visual lectures that forced students to transform oral and written information into a visual form, formed their professional thinking by systematizing and highlighting the most important elements of the educational content;

• lectures in pairs; theoretical issues were discussed from different positions by two teachers, one a Methodist and the other a teacher of a general physics course.

In the first year, the purpose of such a lecture was planned to allow all students, regardless of their individual characteristics, to study the educational material. The educational material of the lecture was given to the students in a live dialogue between two teachers, involving them in active mental activity [4]. Lectures and interviews were gradually introduced into the educational process. They "enliven" the learning process and, most importantly, allow to manage the collective thinking of the group, to use the lectures to convince and eliminate the prejudices of the students.

We used the "round-table" method, which involves holding various (educational, problem-based, systematic) seminars. "Round table" educational meetings were organized to study such topics as scientific research works (physics of solid bodies, biophysics, physics of semiconductors at our university). Before such a meeting, students were asked to formulate questions for discussion. Specialists were given selected questions to prepare for the lecture, and students were invited to independently develop the topic of the lesson using educational literature. In order for the meeting to be active and interesting, an exchange of ideas was established between the students and an atmosphere of free discussion was provided. The collective form of interaction taught students to formulate their thoughts in a professional language, to listen, hear and understand others.

In such classes, the subject and social qualities of the future teacher were formed, educational goals were achieved, and the personality of the future specialist was trained. We used cooperative learning to build students' ability to perceive different points of view, cooperate and find solutions in conflict situations. The main conditions of this technology [4]:

individual, paired, group formation of goals;

collective planning of educational work;

collective execution of the plan;

building one's own activity, choosing information independently;

game forms of educational process organization;

mutual control and cooperation.

This technology has been particularly successful for practical training.

At the beginning of the lesson, the teacher presented the educational problem to the students and gave them the opportunity to analyze it. Students independently united in creative groups, determined the purpose of work in the educational process, determined the topic of research, planned the method of joint activity and found ways to solve the problem. Groups are structured so that they have a leader, an idea generator, opponents and researchers. In each lesson, the leader was changed, which gave all students the opportunity to demonstrate their organizational skills. Creative groups had to be mobile, that is, students were allowed to move from one group to another, together

As a result of such interaction, a discussion arose, during which students had to justify the proposed methods of solving the task, argue logically. Information technology has helped a lot in such ways of working. Educational programs and computer models, virtual repetition of the processes provided in the proposed problems reduced the time spent by students on various types of activities[5]. In addition, each student could perform the same type of tasks, supervise each other, and complete different stages of the overall work. In the process of doing such joint work, students improved their knowledge of technical means.

During presentations using computer technology, students tried to help each other, there was interest in the common result, competition and spirit of mutual understanding. Two principles were taken into account in the selection of groups:

the level of educational achievement of students

the nature of interpersonal relationships.

Students were selected for the group, friendly relations developed among them, because only then a psychological atmosphere of mutual support appeared, anxiety and fear disappeared.

The task of the teacher includes observing the work in groups, participating in the discussion without imposing his own opinion. After the report of the groups on the completion of the task, conclusions were drawn and the results of the work were evaluated.

Due to the fact that our university needs to train highly qualified teachers, business games imitating the professional activity of a teacher have taken an important place in education. Often this technology was used in the general course of physics and seminars on the study of methods of teaching physics. In the business game, a professional environment was created with the help of modern tools [3, page 25]. During the business game, not only typical generalized situations were repeated, but also atypical situations that took the game to a new, higher level, which required the active work of the entire team of students and teachers.

Scientific-theoretical and practical analysis of professional education shows that the role of independent work of students in higher educational institutions is increasing. First-year students are not yet psychologically ready for active independent study. For them, we conducted a number of trainings, in which we showed the optimal methods of working with literature, taught how to solve tasks of various complexity, and introduced the rules of performing and protecting laboratory work.

From the second year of studying physics, we used the method of preliminary independent work [5]. The most acceptable in our practice were two types of pre-reviewed independent work:

• approximate exercises of a practical nature: students were offered to conduct appropriate observations in practice before learning a new topic; based on the students' experience, the teacher explained the material, and the students understood it;

• preliminary works of a theoretical nature: students independently studied individual issues of the subject, prepared lectures on the practical application of this material, and this allowed the teacher to effectively conduct lectures-discussions, various types of seminars.

The results of our research on the application of this method have shown that its effectiveness largely depends on the personal qualities of students, their desire for knowledge, and the improvement of personal and professional growth.

It should be noted that we did not neglect other technologies, because only their integrated use allows to fully improve the educational process.

The results of the conducted experiment were summarized by analyzing the academic achievements of the students. The control of educational achievements for each type of activity was carried out in different ways: tests, control assignments, use of colloquiums, writing and defending essays, recording the results of independent audience and extracurricular activities, evaluating lectures in seminars and participating in discussions. The final control of academic achievement showed an increase in student ratings. If in the first year the number of students with a rating of 80-100 points was 25%, in the second year - 37%, in the third year - 62%, in the fourth year - 77%.

CONCLUSION, our experience of using innovative technologies allows us to confirm the prospects of using active learning methods in preparing students for professional and pedagogical activities. Modern pedagogical technologies can significantly increase the efficiency of the educational process, solve the tasks set before education in terms of training a qualified specialist.

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