POSSIBILITIES OF USING INNOVATIVE EDUCATIONAL TECHNOLOGIES IN ORGANIZING PRACTICAL TRAINING IN THE OPTICAL DEPARTMENT

Umbarov Abduvohid Uktam o'g'li
Teacher of Chirchik State Pedagogical University
Ernazarov Abdurazzoq Nizamiddinovich
Teacher of Chirchik State Pedagogical University

Abstract. *This article is about the possibilities of using innovative educational technologies in the organization of practical training in the department of optics in higher educational institutions, and it shows the factors of developing students' scientific competences through problem-solving classes.*

Keywords: *innovative educational technologies, competence, optics, practical training.*

ВОЗМОЖНОСТИ ИСПОЛЬЗОВАНИЯ ИННОВАЦИОННЫХ ОБРАЗОВАТЕЛЬНЫХ ТЕХНОЛОГИЙ ПРИ ОРГАНИЗАЦИИ ПРАКТИЧЕСКИХ ЗАНЯТИЙ НА ОПТИЧЕСКОМ ОТДЕЛЕНИИ

Аннотация. *В данной статье речь идет о возможностях использования инновационных образовательных технологий в организации производственной практики на кафедре оптики в высших учебных заведениях, а также показаны факторы развития научных компетенций студентов на занятиях по решению задач.*

Ключевые слова: *инновационные образовательные технологии, компетентность, оптика, практические занятия.*

INTRODUCTION

As a result of reforms aimed at education in our country, opportunities are being created to develop the material and technical base of educational institutions and information exchange systems, to integrate information technologies and software-pedagogical tools into the educational process, and to improve educational and methodological support.

The attention paid by our state to the education system, in particular: the adoption of complex measures related to the development of the field of physical education in the following years, the wide range of opportunities created for young people, indicate that the reforms aimed at the education system are at the state level. Using these opportunities to develop practical competencies of students in the department of optics is an urgent issue of the present time.

MATERIALS AND METHODS

Practical training in physics in higher educational institutions includes problem solving, laboratory training and conducting seminars. Working with problems occupies a special place in the system of scientific knowledge, that is, it is a means of strengthening the acquired theoretical knowledge and applying it in practice. In this process, students develop practical and thinking methods, skills and abilities. Problem solving is important in preparation for participation in creative work, in the development of thinking, in independent work, and in finding effective ways to increase productivity.

One of the important conditions for preventing students' knowledge from becoming shallow and superficial and teaching them to apply their acquired knowledge in practice is the issue of performance.

RESULTS

One of the most difficult problems of education is to teach students to solve problems from optics using innovative educational technologies. The effectiveness of problem-solving depends on the methodology used by the teacher and students' mastery of generalized methods of problem-solving. The process of problem solving can be divided into the following four stages:

1. Acquaintance with the condition of the matter;

2. Making a plan for dealing with the issue;

3. Work on the issue;

4. Checking that the issue is handled correctly.

Each stage of working on the problem is carried out under the influence of a specific action. These actions include:

✓ determining the direction of working on the issue, i.e. setting the goal of the action, distinguishing the characteristics of the objects that can be changed, etc.;

✓ determining the composition and execution of the plan by changing it;

✓ implementation of issue processing;

✓ check the obtained result, that is, compare it with the purpose of the work performed.

The basis of teaching students to solve problems is to teach them the problem solving algorithm. The general algorithm for solving physics problems is as follows:

✓ Carefully read the condition of the problem, determine the main question, imagine the processes and events given in the problem;

✓ Due to repeated reading of the condition of the problem, the main question in it, the purpose of the work, and the provision of the necessary information for the work are determined once again;

✓ Write the condition of the problem in the SI system using the accepted designations;

✓ Draw the necessary drawings related to the issue;

✓ Determining the method of solving the problem and making a plan for its operation;

✓ Write the main and additional formulas related to the processes in the condition of the problem;

✓ Finding the equation in general by expressing the desired quantity through known quantities;

✓ Check by putting the measurement units of the quantities in the found equation;

✓ Enter the numerical value of the given quantities into the formula and perform the calculation;

✓ To check the accuracy of the obtained result;

✓ Write down the answer found by working the problem.

Today, the interest and attention to increase the effectiveness of education using interactive methods (innovative pedagogic and information technologies) in the process of organizing practical training on the optics department of general physics is growing day by day. The use of computer technologies in the educational process, especially in teaching the department of optics, gives its high effect. In turn, innovative educational technologies help to increase the effectiveness of achieving the goals and tasks of education through the rational design of the educational process. It is commendable that all new technologies entering the

educational process are being positively received by students. Therefore, it is important to direct their interest in new technologies and active learning activities.
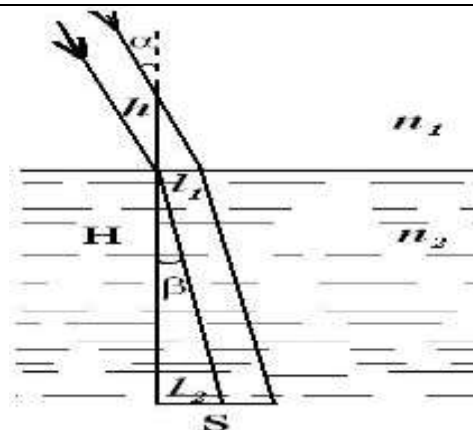
DISCUSSION

Under the direct guidance of pedagogues, students learn to use computer technologies in the educational process, and will be able to use the acquired knowledge to solve problems in the educational process and, later, to solve comprehensive tasks during the period of work. Also, practical trainings conducted with the help of information technologies satisfy the desire of young people to express their attitudes to important life achievements and problems, and provide them with an opportunity to think and justify their points of view. Therefore, the place and importance of modern teaching methods, interactive methods, and innovative information technologies in the educational process of educational institutions is incomparable. Below is an example of a problem worked out using modern educational technologies:

Example of problem solving:

Appendix 1:

A stake is driven into the bottom of a 2 m deep pool. The pile protrudes 0.5 m from the water. Find the length of the shadow cast by the pile on the bottom of the pool when the rays fall at an angle of 30 º.

Figure 1

Given:	*Formula:*
H=2m h =0,5 m $\alpha = 30º$ $n_1=1$ $n_2=1,3$	Using the law of refraction: $\dfrac{\sin\alpha}{\sin\beta} = n_2$ (1) from this: $\sin\beta = \dfrac{\sin\alpha}{n_2}$ (2) From the triangle at the bottom of the picture: $tg\beta = \dfrac{l_2}{H}$ (3) from this: $l_2 = H \cdot tg\beta$ (4) $S = l_1 + l_2 = h \cdot tg\alpha + Htg\beta$ (5)
Must find:	*Calculation:*
S-?	We determine the angle of refraction from expression (2): $\sin\beta = \dfrac{\sin\alpha}{n_2} = \dfrac{\sin 30^0}{1,33} = 0,3846;$ $\qquad \beta = 22^0$

Solving:

From the triangle at the top of the picture: $tg\alpha = \dfrac{l_1}{h}$ from this $l_1 = h \cdot tg\alpha$ (5) - from the expression: The length of the shadow at the bottom of the pool $s = l_1 + l_2 = htg\alpha + Htg\beta = 0,5tg30^0 + 2tg22^0 = 0,5 \cdot 0,5774 + 2 \cdot 0,417 = 0,29 + 0,83 = 1,1(m)$ we find that.

Answer:

The length of the shadow at the bottom of the pool is *S= 1.1* m.

CONCLUSIONS

Active use of modern information and telecommunication technologies in the educational process leads to certain changes in the place, role and pedagogical activity of the teacher in the educational process. The preparation of educational material by teachers complicates their activities, they need to use special skills and methods, as well as information technologies in accordance with the requirements of the time. For this reason, it is the need of the hour to actively work on improving the computer literacy of future academic lyceums, vocational colleges and high school teachers by using information technologies in the process of teaching undergraduates.

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