



Creative Lesson on the General Course of Physics on the Topic "Photoelectric Effect"

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Abstract

This article provides the content of the creative lesson of the atomic physics section of the general physics course on the topic "Photoelectric effect" for students of higher educational institutions.

Keywords: creativity, creative lesson, photoelectric effect, J. Gilford, educational, educational institutions.

In order to improve the methodology for teaching the topic "Photoelectric effect" of the general course of physics in higher educational institutions of the Republic of Uzbekistan, the first task is to organize a creative lesson on this topic. Thanks to such a lesson, students of higher educational institutions can develop their creative thinking and abilities on this topic. What is meant by creative thinking and student abilities? The development of creative thinking and abilities is the guiding principle of learner-centered learning. In this case, the student is an active subject of his self-expression within the framework of professional interests and needs through independent learning activities in the context of specific personal-creative technologies of developing education.

The term "creativity" first appeared in the late 50s in Western psychology and meant the ability of a person to create new concepts and develop new skills. The concept of creativity, universal creativity as a cognitive ability became popular after the publication of the work of J. Gilford. Therefore, creativity, that is, creative thinking and abilities, is rather a collection of different thinking and abilities that a person can acquire at different levels. In a broad sense, creativity is a non-trivial and skillful solution to a problem. Creative abilities of students is a psychological and pedagogical phenomenon. The concept of creativity as a universal cognitive creativity gained popularity after the publication of the works of J. Gilford. The basis of this concept was his cube-shaped model of the structure of the intellect: material X operations X results - SOI (structure of the intellect). In these works, he points out the main difference between two types of mental operations: convergence and divergence. Convergent thinking (convergence) operates when a person solving a creative problem needs to find the only correct solution based on a variety of conditions. In this sense, J. Gilford compared the ability for convergent thinking with intelligence, which is measured by high-speed IQ tests. Under divergent thinking, he proposed to understand the type of thinking that works in different directions, allows a change in the ways of solving a problem and leads to unexpected conclusions and results.

The content of a creative lesson on the topic "Photoelectric effect" may be as follows.

Lesson type: repetition and generalization of the topic "Photoelectric Effect".



Tasks: 1) to give students an idea of the phenomenon of the photoelectric effect, the effect of quantum physics; 2) control of students' knowledge on this topic; 3) the formation of the ability to apply the acquired knowledge in a non-standard environment; 4) develop the ability of logical thinking to compare, find common features and differences, systematize, draw conclusions; 5) development of communication skills.

Tasks (Table 1):

Table 1

Educational:	<ul style="list-style-type: none"> ➤ expansion of theoretical knowledge of students in quantum atomic physics; ➤ creation of the necessary conditions for students to fully master the phenomenon of the photoelectric effect; ➤ demonstrate the practical application of knowledge about the phenomenon of the photoelectric effect.
Developing:	students learn to answer oral questions correctly, develop thinking (perform analysis, comparison, generalization, concretization), learn to draw conclusions based on logical thinking, develop flexibility of thinking through the introduction of game elements, develop emotions and motivation when performing practical tasks.
Educative:	<ul style="list-style-type: none"> ➤ formation of students' scientific outlook; ➤ the formation of life qualities, such as perseverance, accuracy and responsibility.

Decoration: Quotes: 1) the laws of physics are pictures that God creates with His masterpieces (Dan Brown); 2) if you were not afraid of quantum physics, know that you did not understand it (Niels Bohr); 3) the more fundamental the law, the easier it is to form it (Peter Kapitsa).

Equipment: screen, projector and computer.

During the classes

Block 1. Motivation. This block is an original object system that will amaze students. They create conditions for increasing motivation and increasing the curiosity of students. Motivation for the theme "Photoelectric effect" may be as follows.

At the beginning of the 20th century there was a major revolution in physics. It became known that the laws of classical physics are inapplicable to the phenomena of the microworld. Thoughts arose about the dualism of light. Max Planck put forward the idea that atoms emit electromagnetic energy not continuously, but discretely, that is, in the form of light quanta. It was necessary to experimentally prove the correctness of this idea. To this end, in 1887, Hertz discovered the phenomenon of the photoelectric effect. From this point of view, it was necessary to study this phenomenon.

Block 2. Part 1 of the content of the lesson. This block includes a summary of the topic "Photoelectric effect" and the formation of students' creative abilities. This block will look like this for the topic "Photoelectric effect":

The concept of the photoelectric effect and the conditions for its occurrence. The content of the work carried out by G. Hertz. Stoletov's laws. The content of the Einstein equation. Mathematical proof of the photoelectric effect in free electrons. Application of the photoelectric effect.

Block 3. Psychological ease. With the help of this block, psychological relief is provided, which is necessary to harmonize the development of the cerebral hemispheres of students through the



game. For the Photoelectric Effect theme, this block might look like this: stories about famous physicists related to the theme. Professor-teacher shows a portrait of one of these scientists. Any student who recognizes the portrait will briefly tell what he knows about it.

Block 4. Puzzle. This block provides motivation and development of thinking of students. Includes increasingly difficult puzzle questions and tasks adapted to the level of knowledge of the students. This block might look like this for the topic «Photoelectric Effect»: 1) What is the connection between Max Planck and the photoelectric effect phenomenon? 2) Does Einstein have anything to do with the photoelectric effect? 3) What made Stoletov develop the laws of the photoelectric effect? 4) Is there a dependence of the light flux that causes the photoelectric effect on the intensity of light? 5) Does the photoelectric effect occur at an arbitrary value of the wavelength of light that causes the photoelectric effect?

Block 5. Intellectual exercises. This block is a system of complex tasks in which the student has to break his head to find the answer to the question asked on the topic. Only after that he will extract the necessary information on the given question from his knowledge base and make the final decision. This block might look like this for the Photo Effect theme:

Task 1. Why can electrons be knocked out of the atoms of matter?

Task 2. Why does light have duality?

Task 3. Why is there a red limit for the photoelectric effect?

Task 4. Why is the photoelectric effect the beginning of quantum physics?

Task 5. Why does the photoelectric effect occur on free electrons?

Task 6. Why can't a person entering the subway pass through the underpass without throwing a token at it?

Block 6. Part 2 of the content of the lesson. In this block, a system of tasks is organized, aimed at developing students' motivation, diverse and logical thinking, and creative abilities. The appearance of this block on the topic "Photoelectric effect" can be as follows: The professor-teacher said the following opinion: "The electric current in the electrical circuit that I made increased as a result of sunlight hitting the resistor. I didn't know what to do". He requires students to write an essay, that is, a short essay explaining this phenomenon.

Block 7. Computer intellectual support. This block provides motivation and development of students' thinking and a system of increasingly complex computer tasks adapted to their level of knowledge. The appearance of this block on the topic "Photoelectric effect" can be as follows: the teacher shows students through the computer animations and experiments related to the topic "Photoelectric effect". He asks them to explain these things.

Block 8. Summary. This block provides feedback to the students in the lesson and gives a qualitative and emotional assessment of the lesson itself to the students. Each creative activity is represented by a lesson information card, and the lesson information card is represented by the eight blocks described above.

Summing up this lesson, we can say with confidence that pedagogical optimism has a strong influence on the upbringing of a creative personality, and confidence in a student is manifested not only in his abilities, but also in his moral qualities. Pedagogical optimism is expressed in the problematic nature of teaching the formation of the educational process, in the constant complication of cognitive (a theoretical approach aimed at comprehending the way of thinking and understanding the psyche) tasks, in the development of students' creative abilities in rather difficult conditions. than simple education. If the student's reputation with other students and in his



own evaluation increases, communication between professor and student will increase the effectiveness of the promotion described above.

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