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NON-STANDARD PROBLEMS AS THE MOST IMPORTANT FACTOR THAT DEVELOPS STUDENTS' HEURISTIC ABILITY AND LEARNING ACTIVITY

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Abstract: This article discusses the essential, purposeful introduction of methodical innovations aimed at solving non-standard problems related to the Optics department of physics at the students of general secondary schools. The state educational standard of general secondary schools is systematic, meeting the qualification requirements

Keywords: innovation, State educational standard, qualification requirements, optics, education of non-standard issues..

The development of science, technology, and technology requires society and the education system to train specialists who have the ability to think creatively, think logically, analyze information, draw conclusions based on analysis, and advance scientific hypotheses based on these conclusions. Pedagogical experiences show that in order to supply specialists who can meet these requirements, it is necessary to create a pedagogical environment in which learners create problems, classify problems according to the level of importance, and on this basis demonstrate non-standard thinking skills [1, 3 pages]. In order to create such a pedagogical environment, we believe that it is necessary to widely introduce the practice of non-standard problems in the teaching of physics (optics department). In this section, we give ample space to comments on what results we intend to achieve by improving the methodology of solving non-standard problems in optics, a pedagogical problem envisaged in the subject of our research.

It is known that the main purpose of these processes is the formation and development of a certain level of educational activity in the student, even in the conditions where educational processes are carried out by any method, form, tool. By improving a certain methodology, and by creating a certain level of pedagogical environment, it is envisaged to further improve the student's learning activity, to develop his characteristics and abilities as a subject of the educational process.

As a result of the improvement of the method of solving non-standard problems in optics, the topic of our research, we intend to develop students' heuristic imagination, heuristic abilities and further increase their educational and

cognitive activities. One of the main topics of this chapter is the formation of qualities in students by introducing the improved method of solving non-standard problems on optics in educational practice.

According to the observations of specialists (V. I. Andreev, Yu. Kulyutkin, V. N. Pushkin, E. N. Kodrul, etc.), the main characteristics and abilities that are formed and continuously develop in the student as a result of solving non-standard problems in physics (optics department:

1. Development of heuristic ability,

2. Results such as the development of educational activity [2, p. 38].

As a result of solving non-standard problems in physics (optics department), results such as an increase in student motivation, an increase in interest in academic subjects, the formation of independent knowledge acquisition skills, and the development of educational competence are also observed. gives [3, page 12]. The conclusion that comes from this idea is that by improving the methodology of solving non-standard problems in physics (optics department) and creating the pedagogical environment where this methodology can be introduced, we will be able to prepare the ground for the student to become a subject of the educational process.

Therefore, at the beginning of our comments, we will focus on the issues related to how the heuristic ability of students and the development of learning activity in them are essentially described.

Therefore, by solving non-standard problems, heuristic ability is formed in students first of all, and this ability develops during teaching practice in physics (optics department) during solving non-standard problems.

Based on the above considerations, in order to solve non-standard problems in physics (optics department), the learner should have a certain level of heuristic ability. The issue of forming heuristic skills (or skills) is related to the increase in the efficiency of students' mental actions, the level of mastery of educational materials through the ability to perform psychological actions [4, p. 12]. It can be seen from this that in order to form heuristic ability in students, it is necessary to increase the efficiency of mental-intellectual activity in them. V.I. Andreev, A.K. Artemov, G.D. Balk, M.I. Burda, K.V. Vlasenko, N.I. Zilberberg, V.N. Pushkin, G. Scientists such as I. Sarantsev, E.E. Semenov, E.I. Skafa, Z.I. Slepkan, L.M. Fridman reacted through their research [5, p. 17]. However, in the works of most researchers, only the methods and ways provided for in the educational activities in the course of the lesson are considered for the formation of heuristic ability in students. In particular, E. Skafa believes that the following sequence of activities should be carried out in order to form students' heuristic ability:

1. Forming the ability of students to classify the received information according to the level of importance: that is, the first step towards the formation of

the first element of empirical ability is taken by providing the student with several pieces of information on a specific topic and determining which one is the most important among the pieces of information presented in a specific time period.

2. Formation of the student's ability to compare: one textual problem is presented to the student in two different interpretations, that is, one of them contains unnecessary expressions, statements and words, and the student compares the two texts by determining the original version of the textual problem, the next step is taken towards the formation of his empirical ability (this method can also be implemented using images, scenes).

3. Formation of the student's ability to summarize several ideas and create a new idea from them with the help of analysis: in this case, the student is presented with two (or three) separate ideas that are not related to each other at a glance, and the student finds commonalities between the existing ideas and, as a result, a third creates an idea.

4. 4. Forming the ability of students to prove their opinion using evidence: in this case, the student proves the opinion presented by the teacher with the help of laws, terms, concepts, basic formulas, etc. related to physics (optics department) [6, p. 27].

As long as the learning process is a continuous and organic process, it is important not to neglect the formation of heuristic ability not only during the course of the lesson, during the planned training sessions, but also in the extracurricular activities. In this regard, facultative courses in physics, "Young Physicists" club trainings are of great importance. Therefore, the advantage of facultative courses and workshops is that they are organizationally specific: firstly, only interested students participate in such courses or workshops; secondly, due to the small number, it is possible to widely introduce interactive methods, and finally, thirdly, facultative courses and group classes ensure that the teacher conducts training based on an individual approach to each student [7, p. 7].

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The qualitative study of physics knowledge by solving non-standard problems plays an important role in increasing the effectiveness of interdisciplinary communication in general secondary education.

First, when solving non-standard problems, the student "searches" for his existing knowledge using algorithmic methods.

Secondly, using the possibilities of logic science, "creates knowledge from knowledge".

Thirdly, the tool of non-standard problems uses the skills developed as a result of mastering social studies to clarify the essence of the educational task (that is, tries to find the meaning hidden under the word in a non-standard problem and perceives the possibilities of the word).

Fourth, he feels the need to use the "derivation" methods used in mathematical expressions, the possibilities of trigonometric functions.

Fifthly, he uses concepts such as "angle of refraction", "projections of angles" in the science of geometry [4, p. 28].

In addition to the above, solving non-standard problems also ensures the fulfillment of a number of didactic functions. Including:

- increases students' interest in science;

- teaches students to concentrate, distinguish between important and secondary information;

- creates the ground for the activation of the knowledge, skills, and abilities of the student:

- serves as a basis for the student's future mastering of general technical and special subjects [5, p. 21].

Mastering the subject by solving non-standard problems in the teaching of physics (optics department) creates the necessary conditions for the implementation of multifaceted educational and pedagogical functions. That is:

- students' level of mastering theoretical knowledge increases;

- it becomes easier to understand the basic essence of quantities, optical phenomena, concepts related to physics (optics department);

- an environment is created for students' mental and intellectual potential to manifest more;

- students' knowledge of basic subjects included in the curriculum of secondary schools will be strengthened by mastering physics (optics department);

- forms personal qualities such as hard work, perseverance, will, goal-seeking in students;

- is important as a criterion for evaluating the knowledge, skills and qualifications of students in physics (optics department) [6, p. 27].

In the process of solving non-standard problems in physics (optics department), it is envisaged to successfully implement the didactic task of training

sessions as well as the educational and pedagogical tasks. It is derived from the primacy of the factor of quality and quantity in non-standard issues in the performance of educational and pedagogical tasks of training [3, page 47]. Non-standard problems, where the quality factor is primary, as a rule, do not require the use of special mathematical calculations and are given more in the form of words, graphic tools and images. The most important importance of the non-standard issues in the educational sessions, where the quality factor is the primary one, in the performance of the educational and pedagogical task is as follows:

- to teach students to pay attention to each element of the problem presented in the form of words, graphic drawing or image and to identify the expression hidden under it by the method of logical thinking;

- formation of a high level of imagination and imagination in students to be able to describe a non-standard problem given in the form of a picture or graphic;

- to develop the ability of students to express their thoughts, conclusions, hypothetical speech in order to verbally describe a non-standard issue presented in the form of a picture or graphic.

Non-standard problems in physics (optics department), where the quality factor is primary, can be divided into two groups.

1. Simple non-standard issues. (Example given)

2. Complex non-standard issues.

Simple non-standard questions can also be called questions. The solution to these non-standard problems can usually be found with the help of relatively light mental conclusions, the way of manifestation of certain laws of optics.

Complex non-standard problems include two or more "problem-questions" and, accordingly, require a clear idea of several concepts, laws, and quantities of optics and the necessary level of knowledge. When solving complex non-standard problems, it is necessary to analyze several optical laws and find a solution by connecting them. (One of the simple non-standard problems is given).

Formation and continuous development of the creative ability needed by the student to solve non-standard problems in physics (optics department) is one of the important issues envisaged in the field of education today. In the course of our research, we theoretically substantiated the fact that creative ability consists of certain factors (such as analysis, generalization, and ability to see the result) and the high effectiveness of the teacher's individual approach to each student in the formation of each of them. Also, in order to form and continuously develop the creative ability of the student, I will put together a theoretical proposal and recommendations based on my personal experiences and the opinions of experts about what tasks the teacher should perform during classes and extracurricular activities, what kind of pedagogical environment and conditions should be created.

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