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| Research Article

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The importance of the chosen physical model in working with physics problems.

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Abstract: In recent years, significant transformations have been made across all areas of education in the republic, particularly in higher education. Central to these reforms is the implementation of the credit module system and an emphasis on fostering students' independence in learning. The primary goal of these changes is to enhance students' ability to acquire knowledge autonomously, develop analytical and creative skills, and strengthen theoretical understanding through practical applications. This is especially pertinent in teaching physics, where a balance of theoretical and practical training is required. While the theoretical content remains relatively unchanged, modern pedagogical approaches are applied to engage students. In contrast, the content of practical exercises, specifically problem-solving tasks in physics, must be updated to align with contemporary educational goals. Current problem sets, primarily from the 1990s, often lack analytical complexity. To meet modern standards, new problems should encourage students to analyze multiple parameters, validate solutions through alternative approaches, and develop critical thinking skills. This approach places new demands on educators to carefully select and create exercises that meet these evolving educational standards.

Keywords: Higher education reform, Credit module system, Independent learning, Analytical skills development, Physics education, Theoretical and practical training, Modern pedagogical technologie

INTRODUCTION

In recent years, great changes have been taking place in all areas of education in our republic. Based on the concept of modern education, a number of changes are being implemented in higher education. One such change is the credit module system and the emphasis on independent student learning. The goal of each of the introduced changes is aimed at students' independent acquisition of new knowledge, development of analytical and creative skills.

It is known that the newly acquired theoretical knowledge is strengthened by doing practical exercises according to the didactic principle. In modern education, the main attention is paid to applying, processing and comparing the results obtained in different ways, drawing correct scientific conclusions from them, and creating new knowledge for each student. Taking this into account, it is necessary to take into account the uniqueness of science in teaching physics to students in the bachelor's degree in physics, the structure of the educational process mainly consists of theoretical and practical training. Taking this into account, new knowledge and information is gathered in theoretical training. Due to its specific nature, the content of the theoretical training will not be significantly changed, but it is necessary to use new pedagogical technologies during the theoretical training. In order to meet the requirements of modern education, it is necessary to pay attention to the content of practical exercises and the types of problems used in the exercises. It is known that the collection of problems used in practical physics classes was published mainly in the 90s, therefore, 90-95% of the problems presented in the collection consist of quantitative and graphic problems that require almost no analysis [1]. Finding, compiling and selecting issues that meet the modern concept of education requires special pedagogical skills from professors. In new problems that meet the requirements of modern education, it is necessary not to be satisfied with finding only one parameter, but to find several parameters of the physical process, to evaluate or justify the correctness of the answer using alternative methods[2,3].

Problem and its solution

In this article, we will consider what it is necessary to pay attention to when applying the physical assignment given in the practical exercises to a physical problem, then working and justifying the correctness of the received answer.

As an example, consider the following physical assignment. The physical assignment should be given in the form "Estimate the electrical capacity of a person".

In order to complete this physics assignment, the student is required to first formulate a physics problem. For this, the student must understand what parameters are known in the formulation of a physical problem. If we use the concept of capacity for specific physical parameters and select the value of the quantities that are average for the surrounding object, that is, we pay attention to the fact that capacity is applied in two cases.

Capacitance is a non-electric quantity, which mainly refers to the capacitance of a conductor and a system made of conductors; that is to say

- capacity of isolated conductor - $C = \frac{\varepsilon_0 \varepsilon}{\gamma} \frac{1}{R}$

- capacitor capacity - flat, spherical, cylindrical

We use the isolated conductor capacitance in this problem to estimate the human capacitance because the human body is considered a good conductor. We take this point of view as a basis when formulating a problem and formulate a problem as follows.

"Find the electric capacity of a person with a mass of 75 kg, if the density of the human body is 1070кг/м^3 ". In the preparation of this problem, the student performs activities such as analysis and data search, that is, after analyzing the task, he selects the model of "isolated conductor", as a result of data search, he finds the quantities related to the weight and density of the human body.

To find the numerical value of the capacitance, a mathematical expression is necessary. For this purpose, we use isolated conductor capacitance. The following two mathematical expressions for conductor capacitance are used in textbooks and educational guides.

$$C = 4\pi\varepsilon_0\varepsilon R \text{ , (1)}$$

$$C = \frac{\varepsilon_0 \varepsilon}{\gamma} \frac{1}{R} = \frac{\varepsilon_0 \varepsilon}{\gamma} \frac{1}{\rho \frac{l}{S}} = \frac{\varepsilon_0 \varepsilon S}{l} \text{ (2)}$$

(2) (2) geometric quantities л and C in the formula are related to each other, because V=Cл, increasing the value of one causes the value of the second to decrease. Due to such a connection, people of average mass are divided into different magnitudes for electric capacity and do not allow to analyze the correctness of the answer obtained.

Results and discussion

Therefore, we use the second mathematical expression to estimate the capacity. using the first mathematical expression, only the capacitance of a spherical conductor is found, so we consider the human body to be spherical, if that's the case $V = \frac{4\pi R^3}{3}$ ва $m \approx \rho V$ if we use the expressions R= $\frac{1}{2}\sqrt[3]{\frac{m}{\rho}}$ we find that or $C = 2\pi\varepsilon_0\varepsilon\sqrt[3]{\frac{m}{\rho}}$ we estimate the capacity with the help of the expression. Here ε – dielectric constant of the atmosphere. If we take into account that the human body consists of more than 70% water, it is possible to use the dielectric absorption of water. If so $C \approx 2 * 10^{-9}\Phi$ we will have a value around

The main reason why we could not use capacitors of different shapes in the evaluation of the capacity of the human body is that the human body is a good conductor, and the biggest drawback of our evaluation with this method is that the capacitor device has a condition that the distance between the plates should be very small compared to the size of the plates, this condition is not met in our model. In addition, since the human body conducts electricity well, considering it as a dielectric leads to the

formation of a wrong concept in students. In addition, since the human body has a cylindrical shape, we can also model it as a cylindrical condenser, but in this case, it does not meet the condition for the condenser.

Conclusion

The use of problems or physical tasks like the above in practical training in physics develops a number of characteristics in students and students and leads to the development of required skills.

-develops students' ability to choose the optimal physical model for the problem

- students develop the ability to create a physical problem with a solution based on the task

-students develop abilities such as justifying the correctness of the solution to the formulated problem, analyzing and creating new knowledge for themselves, that is, creativity

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