

THE IMPORTANCE OF THE PHYSICS SUBJECT IN DEVELOPING PROFESSIONAL COMPETENCE

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At present, through the initiatives of our national leader, significant reforms have been implemented in the education system, creating ample opportunities for the further development of young people's knowledge and worldview. The construction of preschools in remote rural areas, the modernization of schools with up-to-date technical equipment, the opening of new universities, the expansion of enrollment in higher education institutions, the creation of special opportunities for girls to study at universities, and the facilitation of study transfers for young people studying abroad all serve as clear examples of these developments. A natural question arises: To what extent are young people taking advantage of these opportunities? What is the current level of their knowledge? Can their worldview serve as the foundation for building our New Uzbekistan?

Yes, indeed, many of our young people are making good use of these opportunities, pursuing education diligently, and bringing joy to both the eyes and the heart. However, there are still quite a few who fail to take advantage of them. Such young people, neglecting their future, misuse the opportunities provided to them, and fail to acquire even the basic knowledge that compulsory education should ensure. As a result, they often remain unemployed, engage in various destructive activities, and harm the development of our country.

It is only natural that such youth not only ruin their own future but also negatively influence the mindset of their peers. When we seek the causes of this problem, we find that many of them lie within the education system itself. Since childhood until adulthood, a person spends the most formative years of life in school.

According to the research results, it was concluded that physics, biophysics, the principles of installing medical instruments, as well as the physical methods used in medical diagnostics and treatment, constitute the essential content of physics studied in schools and lyceums, and are of great importance for a doctor's professional activity.

Therefore, vocational education is considered one of the key concepts in the teaching of physics. Below, as an example of the topic "Mechanics of Liquids and

Gases. Bernoulli's Equation" taught in the upper grades of secondary schools, we present methodological recommendations for teaching physics based on medical education.

Topic: *Mechanics of Liquids and Gases. Bernoulli's Equation.*

After providing the theoretical knowledge on this topic, the teacher organizes a question-and-answer session with the students.

Teacher: "If we take the flow of blood in the vessels as an example of liquid motion, what kind of flow is it? Laminar or turbulent?"

Student 1: "The flow of blood in the vessels can be considered laminar, because according to the definition of laminar flow, layers of liquid move at different speeds without mixing with one another. Since the diameters of blood vessels vary, the blood flows at different speeds without mixing, which demonstrates laminar flow."

Student 2: "I would also classify the flow of blood in the vessels as turbulent. According to the definition of turbulent flow, the layers of liquid mix with each other and move at high speed. This can be observed in the movement of blood along the aorta as it leaves the heart."

Teacher: "Correct. Both students have given accurate answers. From this, we can see that the movement of blood in the vessels is laminar in some areas - such as in the capillaries and small blood vessels — while near the heart, in the aorta, and at the bends of large blood vessels, the flow becomes turbulent."

Question: "Can the fats that form on the walls of blood vessels affect the movement of blood?"

Student 3: "Yes, of course. I believe they have a negative effect. According to Bernoulli's principle, in sections of a pipe where the fluid velocity is low, the pressure is high, and conversely, where the velocity is high, the pressure is low. From this, it follows that when the walls of blood vessels are covered with fatty deposits, the vessels become narrower. This reduction in the radius of the blood vessels decreases the velocity of blood flow and increases the pressure, which in turn raises hydraulic resistance. As a result, heart diseases may develop."

Teacher: "Your answer is correct. Does everyone else agree with this opinion?"

Student 4: "We also believe that this answer is correct. We can observe similar phenomena in our daily lives. For example, when we water the yard using a rubber hose, if we partially cover the outlet of the hose with our thumb, the water is sprayed farther due to increased pressure. If we cover the outlet even more - that is, reduce the radius of the hose - we can see that the pressure causes water to leak from the section connected to the faucet. The same happens in blood vessels: due to the accumulation of fatty deposits on the vessel walls, the radius of the vessels decreases, the hydraulic resistance increases, and as a result, diseases such as heart attacks and strokes - which we often hear about - may occur."

Teacher: “Thank you for your answer. It is clear from your explanation that you have correctly interpreted Bernoulli’s equation and the concept of hydraulic resistance. The movement of blood through the vessels has also been studied by many scientists – for example, the French physicist Poiseuille. Hopefully, when you enter medical universities, you will recall this topic and study it in greater detail.”

“We should also take into account that the speed of blood flow in the vessels depends not only on the radius of the vessels but also on the viscosity - that is, the stickiness - of the blood. What do you think? Does the viscosity of blood decrease or increase its flow rate through the vessels?”

Student 5: “Of course, it decreases. For example, if we pour equal amounts of two liquids with different viscosities - say, water and honey - into separate containers and start pouring them from the same height, the water will flow down faster. From this, we can see that viscosity reduces the speed of a liquid’s flow.”

During this activity, the teacher observes that the students’ interest, motivation, and sense of responsibility gradually increase. Through short discussions based on medical examples, students find solutions related to the topic. In this method, the focus is not on whether a student’s answer is right or wrong, but rather on the fact that they are thinking -which encourages every student to participate actively.

References

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