METHODOLOGY FOR FORMING PROFESSIONAL COMPETENCIES IN FUTURE TEACHERS OF PHYSICS WITH THE ASSISTANCE OF PRACTICAL ASSIGNMENT

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Abstract. *The article is devoted to the formation of professional competencies in future physics teachers, in which issues of practical content were considered as the main factor. The formation of skills for distinguishing or independently structuring issues of practical content, as well as the stages of its solution, are substantiated. Examples of issues of practical content are also presented.*

Keywords: *tasks of practical content, competence, professional competence, formation of professional competence, personality-oriented education.*

Every teacher, including physics teachers, who works in the conditions of person-oriented education, cannot work effectively without acquiring professional competencies. Issues of practical content play an important role in the formation of professional competencies of future physics teachers.

The main features of practical issues are specific and include:

- in forming a scientific outlook;

- correctly understanding the laws of nature;

- in the formation and development of the ability to move from setting a specific issue to a scheme;

- formation and further development of the ability to analyze a given process, to divide it into stages and to identify special cases;

- plays an important role in the formation of the skills of applying general theoretical conclusions to solve specific problems.

In order to ensure the quality and effectiveness of teaching when solving problems of practical content, a physics teacher is required to classify them according to the level of difficulty. In the scientific and methodical literature, there are a number of techniques that describe the arrangement of problems by increasing the level of difficulty, that is, following the principle of didactics **"from simple to complex".** But the complexity of solving the problem in practical terms is primarily related to the implementation of the stage of physicalization of its content. Depending on the complexity of choosing mathematical equivalents for real objects and relationships described in the problem situation, the following types are distinguished:

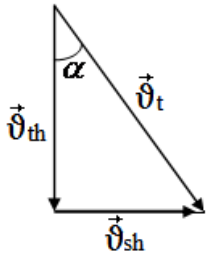
1. The objects of the problem and the relations between them are related to the corresponding mathematical objects and relations, but the text of the problem lacks direct information about some model .

2. It is necessary to take into account important situations in the text of the problem, because the relationship between the objects in the problem and the relations between them with the corresponding mathematical objects and relations is not fully defined in the text of the problem.

3. Objects and relations are not clearly separated in the problem or their physical equivalents are unknown to students.

We give examples of selected types of problems.

Problem solving 1. When the wind speed is equal to 10 m/s, the raindrop is falling at an angle of 300 to the vertical (picture). What is the speed of the wind when the drop falls at an angle of 600 to the vertical?



Solution:

The speed of the drop in the reference system related to the air in motion. This is the speed of a raindrop $\vec{\vartheta}_{th}$ in the absence of wind. This velocity is vertically downward. The law of addition of velocities for a drop, i.e.:

$$\vec{\vartheta}_t = \vec{\vartheta}_{th} + \vec{\vartheta}_{sh},$$

Here $\vec{\vartheta}_{sh}$ is the wind speed. We describe this equation in the form of a triangle (wind speed is horizontal). From this triangle, we find the following relationship between the drop angle and the wind speed: $tg\alpha = \frac{\vartheta_{sh}}{\vartheta_{th}}$. We write this ratio for two angles and get their ratios: $\frac{\vartheta_{sh2}}{\vartheta_{sh1}} = \frac{tg\alpha_2}{tg\alpha_1}$.

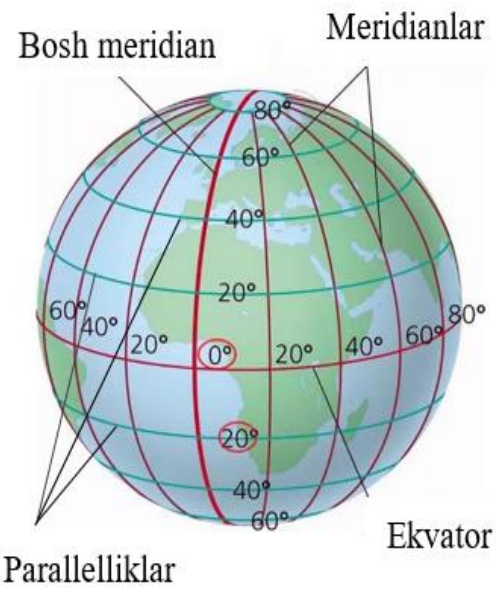
Here $\vartheta_{sh2} = \vartheta_{sh1}\frac{tg\alpha_2}{tg\alpha_1} = 30\,m/s.$

Answer: ϑ_{sh2} = 30m/s.

Objects and relations in the proposed problem are easily associated with well-known and corresponding physical objects and relations due to life experience.

Problem solving 2

Issue 2. At what latitude of the earth is the parallel length less than a quarter of the equator? (picture) Identify the concept that is mathematically equivalent to the concept of "width". In doing so, consider the different approaches to the definition of this concept (it is appropriate for students to be based on ideas about the shape of the earth). Solve the problem based on the above



Solution: First of all, when solving this problem, *the concepts of equator, latitude of the earth, length of the parallel to the latitude of the earth, latitude are defined based* on the knowledge acquired in the science of geography**.**

Equator is an imaginary line that is equidistant from the poles and divides the Earth's surface into the Northern and Southern Hemispheres, and all its points are equidistant from the Earth's poles. The equator is the longest parallel, and the other parallels decrease in length to the south and north of the equator. The closer to the pole, the shorter the length of the parallels.

The word equator is derived from the Latin word "aequator", which means "equal divider" in Uzbek. Equator: the geographic equator, divided by the Earth's equator.

A large circular line on the earth's surface equidistant from the poles is called the earth's equator, i.e. it is a line of intersection of the earth's surface with a flat surface perpendicular to the axis of rotation of the earth and passing through its center, its length 40,075,696m is equal to 40,000km.

It is the radius of parallel latitude less than a quarter $R_1 = \frac{3}{4}R$ is equal to will be. From this $l_1 = 2\pi R_1$; $l_1 = 2\pi \frac{3}{4}R = 2\pi \frac{3}{4} \cdot \frac{40000}{2\pi} = 30000$ km.

So, 30,000 km long parallel is equal to "latitude".

Thus, in the process of training students from a methodological point of view, it is necessary to pay special attention to the level of acquisition of theoretical knowledge of physics in teaching the school physics course oriented to practice. Because, in the process of solving a problem, in building a mathematical model after studying its condition, the level of mathematical knowledge used in solving the problem is important. That is why the future physics teacher needs to have sufficient training in the process of teaching students to solve problems.

The problem of practical content is considered a certain type of activity, and it is appropriate to implement the stage of mathematical modeling of its solution in the following order:

- determining the content of non-physical concepts in the conditions of the problem;

- to distinguish important real things from its text to solve the problem and determine their properties;

- establishing relations between the objects under the conditions of the issue;

- selection of mathematical equivalents for objects and relations selected from the condition of the problem. [1; 2; 4]

In order to select problems of a certain type of practical content from various sources or independently compose problems of such content, future physics teachers should have sufficient methodological training, as well as they should meet the following requirements for the content of problems of practical content necessary [2; 3].

- presence of specific practical content in the text of the problem;

- the text of the problem reflects the relationship of physics with other sciences;

- that the text of the issue is related to some fields of practical activity;

- students' ability to understand non-physics materials in the content of the problem;

- the creative value of the content of the issue and its educational effect;

- the existence of object properties that require the application of previously known mathematical knowledge to solve the problem;

- the physical content of solving the problem, etc.

Based on these requirements, students master the modeling method and its features in solving practical and practical issues. Also, they learn the stages of use in solving practical and applied problems in the school physics course and acquire the ability to develop a description of the method of solving problems with a practical and applied content. In these requirements of teaching to solve problems with practical and applied content, students' theoretical readiness to formulate problems with practical content is checked. For this purpose, during the training period

of the future physics teacher, students are offered tasks that include the following tasks in the process of learning the subject "Physics Teaching Methodology":

1) the school conducts an analysis of educational materials for the physics course;

2) to be able to divide the considered practical issues into groups according to the level of complexity;

3) be able to assess the compliance of the considered practical issues with methodological requirements for their text and mathematical content;

4) to solve the practical issues under consideration:

a) formation of concepts;

b) to be able to form small groups of students to fulfill the task of developing research skills, etc.

5) to be able to describe all the stages of physical modeling of the problem of practical content under consideration and to be able to prepare a set of questions in advance that will guide the students to search for a solution to the problem;

6) to be able to create a physical model of real situational issues under consideration;

7) to be able to distinguish issues of different content, but with the same physical model, from the issues of practical content under consideration;

8) to be able to create a physical model of the problem in the considered practical content and determine several options of the solution within the model;

9) able to develop a summary of the lesson, which is organized with the help of problems of practical content, etc.

At the main (second) stage, students study various sources and select problems that meet methodological requirements from a set of problems of interrelated practical content or independently compose such problems. A system of step-by-step actions, i.e. a "road map" is offered to the student to organize the educational process when designing practical issues. In the implementation of the road map, the student's theoretical and practical preparation is important for the effective performance of the main activities.

The "Road Map" includes the following methodological guidelines for students' educational activities:

- to create the information field of the situation and to choose the material that allows to compose the issue of practical content;

- to determine which problem can be solved within the framework of the physical theory or with the help of which physical tools and connect it with the possibilities of the school physics course;

- building a structured practical content model;

- assessment of the possibilities of the formulated problem in physics teaching or its practical application;

- development of methodical recommendations for solving the problem;

- giving a methodical methodical description of the issue.

At the experimental (next) stage, problems of practical content selected or created by students are tested. In this case, such issues may be a set of problems with a practical content that are interrelated, or methodical developments aimed at organizing facultative courses aimed at strengthening the practical orientation of physics at school. This experiment can be carried out during the pedagogical practice of students in educational institutions.

Teaching future physics teachers to choose problems of practical content or independently compose and solve them has an important place in the formation of their professional competences.

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