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USING METHODOLOGICAL COMPETENCE-ORIENTED PROBLEMS IN THE TRAINING OF MATHEMATICS TEACHERS AS A PEDAGOGICAL ISSUE

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Abstract
This article is dedicated to the training of modern mathematics teachers. It thoroughly explores the development of their ability to apply the knowledge acquired in higher education to their professional practice, as well as the role of this competence in their professional activities.

Keywords: Competency-based approach, professional activity, educational process, competence, professional competence, competence-oriented problem.

Introduction

The profound reforms taking place in our society also require higher education to seek effective methods that increase the efficiency of specialist training, to identify the best ways of using specific forms, tools, and methods of instruction, and to integrate the results of such research into daily practice. These requirements have made bringing specialist training in our country to the level of modern demands one of the priority directions. In this regard, it is advisable to organize the continuous education system based on a competency-based approach.

Organizing the educational process on the basis of a competency-based approach “makes it possible to comprehensively develop in each member of society the knowledge and practical skills needed to act effectively and with quality in all areas of life for the benefit of society and the state.” This is because, in education, the competency-based approach is aimed at shaping individuals who can adapt to

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different life situations. However, within this approach, it is essential not to neglect the knowledge, skills, and abilities that define the foundations of a discipline in any situation.

In a competency-based approach, the main learning outcomes are recorded as a set of educational competences, which "define the criteria for selecting the essential content and conditions for organizing the main types of activities that enable students to assimilate social experience and acquire life and practical skills in modern society" [1].

For a future mathematics teacher to become a qualified and modern educator, the following are required:

- mastering the activities necessary for acquiring the knowledge needed to solve various problems encountered in professional and daily life;
- acquiring methods of activity that support the process of independently and effectively mastering knowledge;
- learning ways to use specially developed methodological, competence-oriented problems, employing various tools and methods of cognition.

Therefore, today the professional preparation of every future teacher, including mathematics teachers, must be grounded in a competency-based approach.

Overall, one of the main goals of modernizing the education system in our country today is to train teachers capable of adapting to contemporary educational conditions, timely assimilating innovations in psychology, pedagogy, and methodology, and carrying out effective professional activities on this basis.

When it comes to preparing teachers of a specific subject (for example, mathematics), the main task is to improve their specific theoretical and methodological training in that discipline. This process is formed within the educational process implemented at higher education institutions.

Professional competence in mathematics teaching refers to the ability to carry out types of professional activities associated with teaching mathematics in the general secondary education system, based on a system of theoretical knowledge.

As can be seen from the above, adequately developing professional competences not only ensures that a future teacher does not remain limited to the knowledge acquired at university, but also leads to the formation of skills for continuous professional development throughout their career. Furthermore, organizing the

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educational process on the basis of a competency-based approach increases the capacity of all subject teachers, including future mathematics teachers, to build their individual pedagogical practice in accordance with the demands of the times.

In general, organizing the educational process based on a competency-based approach helps future mathematics teachers to form connections between the knowledge and skills they acquire and to integrate them into their professional expertise. This, in turn, plays a key role in helping every future mathematics teacher understand the vital importance of education for themselves personally.

Because, in a competency-based approach, knowledge is not simply given ready-made to students; instead, they are required to acquire it independently and creatively through active participation under the guidance of the teacher.

In the training of future mathematics teachers, it is of particular importance to develop their skills in solving methodological, competence-oriented problems.

A **competence-oriented problem** is a problem that requires the integrated application of knowledge from various disciplines to solve issues encountered in everyday, real-life, and professional activities.

In the current context where transforming the educational process has become a necessity, developing professional competences in future mathematics teachers is an essential condition. Organizing the educational process in this way requires a change in how teachers provide methodological guidance for student activities. These changes are reflected in revising the goals, content, forms, methods, tools of instruction, and approaches that guarantee the achievement of learning objectives in advance. In this process, the effective use of competence-oriented methodological problems plays an important role [4].

Research shows that, in preparing future mathematics teachers, competence-oriented problems are the primary means of developing professional competences. Such problems are distinguished by the following characteristics:

- They include actions that correspond to the content of mathematics;
- They serve as tools to help students consciously acquire the knowledge, skills, and abilities related to each topic;
- They are methods for organizing and managing students' educational and cognitive activities;

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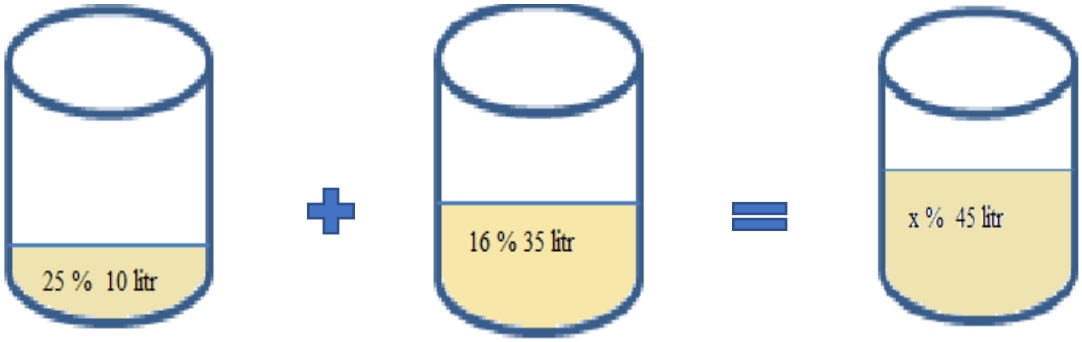
- They are factors in selecting appropriate teaching methods and implementing them effectively;
- They are tools for linking theory and practice;
- They provide a way to integrate mathematics with other disciplines;
- They serve as means for vocationally oriented mathematics instruction;
- They strengthen the applied focus of mathematics;
- They are tools for developing professional competences [3].

Based on the above, let us consider examples of competence-oriented problems: When solving word problems, not only does student engagement and interest increase, but connecting problems with other subjects also contributes to developing professional competences. For example, by linking to computer science, students can create presentations, slides, diagrams, and other digital resources relevant to the problem. Likewise, many word problems in mathematics are closely connected to subjects such as chemistry, physics, and biology.

Example 1.

A mixture was prepared by combining a 25% solution of a certain substance in 10 liters of water with a 16% solution of the same substance in 35 liters of water. What is the concentration percentage of the resulting solution?

Solution: To make it clearer, we will illustrate the containers, mark how many liters of water they contain, indicate the percentage of the substance in each, and then write the concentration of the resulting solution. (See Figure 1).



Container I **Container II** **Container III**

Figure 1

In Container I, there is a 10-liter solution with a 25% concentration.

In Container II, there is a 35-liter solution with a 16% concentration.

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When mixed, we obtain a 45-liter mixture. The amount of the substance in the third container will be as follows:
Amount of substance=(10×0.25)+(35×0.16)=2.5+5.6=8.1 liters

$$8{,}1=\frac{x}{100}\cdot 45 \Rightarrow x=18\%.$$

Answer: The concentration of the resulting solution is **18%**.

Example 2.

There are two different alloys. The first contains 10% copper, and the second contains 24% copper. The mass of the second alloy is 3 kilograms more than the mass of the first alloy. A third alloy was prepared from these two, containing 18% copper. What is the mass of the third alloy? Express your answer in kilograms.

Solution: Let the mass of the first alloy be **x kilograms**. Then, the mass of the second alloy is **(x + 3) kilograms**.

The amount of copper in the first alloy is **0,1x kg,** The amount of copper in the second alloy is $0{,}24(x+3)$ **kg.** The total mass of the third alloy is: $x+x+3=2x+3$ **(kg)** The amount of copper in the third alloy is $0{,}18(2x+3)$ **kg**.

We set up the equation and find the solution:

$$0{,}1x+0{,}24(x+3)=0{,}18(2x+3);\Rightarrow 10x+24(x+3)=18(2x+3),\Rightarrow x=9$$

The mass of the third alloy:

2x+3=21 kg.2x + 3 = 21 \text{ kg}.2x+3=21 kg.

Answer: 21 kg.

In the problem under consideration, one can see the connection between mathematics and chemistry. Problems of this type contribute to the development of research competences.

The integration of environmental issues into mathematics requires teachers not only to acquire new knowledge but also to adapt their teaching methods. When designing such problems, it is necessary to take into account real and locally relevant data, and it is advisable to use them as a basis for providing ecological education.

Referring to real-life problems gives teachers the opportunity to develop students' information competences. From lesson to lesson, it is important to increase the level of work with primary sources, which helps students adapt to the information

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space of the modern world. In this way, students not only develop their information competences but also enrich their life experience.

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