Khmelnikova Lyudmila Ivanivna
Ph.D., associate professor of the Department of Biochemistry and Medical Chemistry
Murashevich Bohdan Valeriyovych
Ph.D., associate professor of the Department of Biochemistry and Medical Chemistry
Dnipro State Medical University, Ukraine

Solution of situation problems as an element of STEM-technology in the training of future pharmacists

Анотація. *Therefore, the solution of tasks of practical content in the training of future pharmacists is a complex, but extremely important process, covering various aspects of training. With the help of the method of solving problems of practical content, students have not only theoretical knowledge, but also practical skills, critical thinking and the ability to work in a team.*

Ключові слова: *STEM-technology, pharmacists, situational tasks,*

The functioning of the STEM-education system [1, c.1] in the conditions of martial law is characterized by an intensive search for new approaches to learning, innovative forms of organizing the educational process, effective pedagogical and information technologies.

Situational tasks are close to problem tasks and are aimed at identifying and understanding the way of activity. When solving situational tasks, teachers pursue different goals: for students - to find a solution that corresponds to the given situation; for the teacher - students' mastery of the method of activity and awareness of its essence. Situational tasks include information "from life" andaimed at revealing students' knowledge about the surrounding world, establishing new logical connections.

In the modern educational environment, chemical disciplines are not only educational subjects, but also an important tool for the development of logical thinking and analytical abilities of students. The method of solving problems of

practical content is especially relevant [2, c.6], because it allows students to realize the real application of chemical knowledge in everyday life. The use of problems of practical content also increases the motivation of students to study chemical disciplines, making learning more interesting and meaningful. In this context, the research of effective methods and approaches to learning, which would contribute to the successful solution of such tasks, is relevant. The purpose of the work is to describe and substantiate the methodology for solving tasks of practical content in the preparation of future pharmacists.

When performing this work, the works of domestic specialists on the problem, as well as statistical sources, periodical and electronic resources, were studied and used. Tasks of practical content play an important role in the educational process, because they make students aware of the need to study new theoretical material. They demonstrate how chemical concepts arise from real-life situations, encouraging students to actively explore. At first, students show interest in solving individual tasks, which allows them to consolidate their knowledge and move on to more complex topics. Eventually, this process can lead to a deeper understanding of science itself, as students begin to see chemical principles as tools for understanding the world around them.The functions of applied tasks are multifaceted and cover educational, educational and developmental aspects [3, c.65]. The educational function is implemented at all stages of studying the educational material, including the initial consolidation of knowledge at the stages of studying the educational material and control. The educational function, in turn, stimulates the cognitive abilities of students, expanding their worldview through various informational contexts.

The developmental function promotes the development of memory, attention and logical thinking, teaches students to identify common problem-solving methods and apply them in new contexts. Applied tasks not only deepen theoretical knowledge, but also develop practical skills necessary for successful functioning in the modern world.

The method of solving problems of practical content in the training of future pharmacists is an important component of the educational process, which contributes to the formation of students' practical skills and their ability to think critically. It involves not only the assimilation of theoretical knowledge, but also their active use in real life situations, which in turn increases students' motivation to study [4, c.3]. In this context, several key aspects determining the effectiveness of this technique can be identified. First of all, an important stage in the process of solving practical problems is problem formulation. Students must learn to understand the conditions of the task, determine its purpose and ways of achieving the result. This requires them not only to know the theoretical foundations, but also to be able to analyze the situation, which, in turn, shapes their critical thinking.The teacher can use a variety of strategies, such as situational tasks, project activities, and discussions, to encourage students to actively discuss and formulate their own hypotheses for solving problems. The next important aspect is the application of an integrated approach to learning. The method of solving problems of practical content involves a combination of knowledge from various subject areas.This allows students to see the connection between theory and practice, and to realize the importance of interdisciplinary connections in real life. Teachers can integrate material from chemistry, biology, mathematics, physics and other subjects, which contributes to the formation of a holistic view of the world and the devlopment of skills necessary to solve complex problems. In addition, an important element of the methodology is the use of modern technologies.

Modern students, who have grown up in the age of information technologies, expect interactive and dynamic learning. The use of computer simulations, simulation programs and online tools can significantly increase the effectiveness of the educational process. Such technologies allow students to visualize the results of their actions, experiment with different scenarios and receive feedback in real time, which creates conditions for a deeper understanding of the educational material.

No less important is the formation of teamwork skills in the process of solving tasks. Modern learning emphasizes partnership approaches that allow students to

exchange ideas, share experiences, and find joint solutions. Teachers can organize group projects, during which students work together on practical tasks, discuss different approaches to solving them and together evaluate the results of their activities. This not only promotes communication skills, but also prepares students for real-world teamwork, which is important in a professional environment. Among modern teaching methods, chemical modeling occupies a central place because it helps students understand the connection between theoretical knowledge and real situations, which in turn increases motivation to study the subject. To prepare students for chemical modeling, it is important that the teacher uses a variety of forms and methods at all stages of learning. At the initial stages, it is advisable to focus attention on the formation of the ability to determine essential factors and find the correct chemical solutions. Students should understand that to solve a practical problem it is necessary to create a chemical model, which can take the form of a word problem, a chemical equation, or a function.

This approach will help lay a solid foundation of knowledge necessary for successfully solving more complex tasks in the future. We will give examples of problems of practical content that can be used during the study of physical and colloidal chemistry. When repeating concepts about the chemistry of dispersed systems, the following problems can be considered:

1.Make a micellar formula of calcium carbonate sol, which is used in medicine for diseases of the digestive tract, based on the reaction of calcium chloride with sodium carbonate (during electrophoresis, the granule moves to the cathode).

2. Calculate the iron number (S) of gelatin (stabilizer), which is used in a volume of 2 ml with a mass concentration of 0.025 g/l to protect against coagulation of 10 ml of calcium carbonate sol from 1 ml of sodium sulfate. solution with a mass fraction of 10%.

3. Calculate the coagulation threshold of sodium sulfate to cause apparent coagulation of 100 mL of a calcium carbonate sol when 62.5 mL of a solution with a molar concentration of sodium sulfate equivalent of 0.01 mol/L is added to the sol.

Name the ion of the electrolyte that causes coagulation of the sol if the pellet moves to the anode during electrophoresis.

4. Calculate the relative, specific and reduced viscosity of casein, if the time of outflow from the viscometer was 25 s (the mass concentration of the solution was equal to 0.4 g/l), and the time of outflow of water was 23 s. (density of solutions is one unit).

5. At what pH value can albumin be isolated from a solution containing albumin (pI=4.9), globulin (pI=7.0), collagen (pI=4.0)

The use of the presented tasks can be adapted to different forms of learning: from working with the entire group of students to individual or group tasks. This allows for a variety of learning styles and student needs, including those with a special interest in chemistry and its practical applications.

Situational tasks are the key to high-quality test control during the "STEP-1" licensing exam, in order to avoid the student's excessive concentration on mindless memorization of the content of test tasks and correct answers and to expand his interests and knowledge in the field of chemical disciplines. Therefore, we apply a versatile approach to educational and methodological support of chemical disciplines. During the preparation for practical classes, the student is asked to complete a number of tasks after studying the lecture material and recommended literature to check his own learning efficiency.

Methodical instructions for self-training of students contain examples of test tasks and situational problems, accompanied by detailed sample answers and explanations, as well as tasks for independent solution. Since chemical disciplines, as educational disciplines, have an extensive system of connections with other disciplines relevant to the future pharmacist, tasks for self-training and knowledge level control are selected taking into account relevance and practical importance.

Situational tasks are also offered as a form of control when checking the assimilation of knowledge and practical skills in the form of exit control elements at the end of the classroom session, while the input control consists exclusively of test tasks. The teachers of the department have developed situational problems in medical

chemistry in Ukrainian and English of several types of structure. For example, students are asked to match the chemical structure (formula) of a medicinal substance, its name and pharmacological group.

Situational tasks are also introduced, in which the student independently, using the given formulas, presents the metabolism schemes of certain medicinal substances, differences in the chemical structure of medicinal substances of the same pharmacological group, and the dependence "chemical structure - pharmacological activity". Another type of situational problem is the problem, which offer the student to choose appropriate methods of drug identification and to differentiate methods of analysis.

Therefore, the solution of situational problems allows the student to apply in practice all acquired knowledge and skills, to establish connections between the elements of the studied material, as well as to consolidate a deep understanding of the studied topics. It is necessary to put the principle of educational partnership of students, teachers and researchers as the basis of modern training methods.

To reduce the distance as much as possible in the relationship: "university - teacher - student", in particular in the organization of the educational process. An indicator of scientific activity is participation in scientific conferences.

An example of such activity was the participation of pharmacist students in: the second international symposium "Education and health of the younger generation", 2018; VIII and X All-Ukrainian scientific and technical conferences of students, postgraduates and young scientists "Ecological problems of the regions", Dnipro, 2019, 2020. r.; XX, XXI All-Ukrainian conferences of young scientists and students on topical issues of modern chemistry, Dnipro, 2022, 2023. VIII International scientific and practical conference "Innovative development of science, technology and education", Vancouver, Canada, 2024; The 10th International scientific and practical conference "Modern research in science and education "Chicago, USA, 2024

Therefore, the solution of tasks of practical content in the training of future pharmacists is a complex, but extremely important process, covering various aspects of training. With the help of the method of solving problems of practical content,

students have not only theoretical knowledge, but also practical skills, critical thinking and the ability to work in a team.

The introduction of modern technologies, integration of disciplines and emphasis on teamwork create conditions for a deeper understanding of the educational material, which in turn contributes to the preparation of future pharmacists for the challenges of the modern world.

Situational tasks are close to problem tasks and are aimed at identifying and understanding the way of activity. When solving situational tasks, teachers pursue different goals: for students - to find a solution that corresponds to the given situation; for the teacher - students' mastery of the method of activity and awareness of its essence. Situational tasks include information "from life" andaimed at revealing students' knowledge about the surrounding world, establishing new logical connections.

СПИСОК ДЖЕРЕЛ:

1. Наказ МОН України № 188 від 29.02.2016 р. «Про створення робочої групи з питань впровадження STEM-освіти в Україні». URL: https://mon.gov.ua.
2. David W. White What is STEM education and why is it important? /W. David //Florida Association of Teacher Educators Journal- Volume 1, Number 14, 2014, с. 1-9.
3. Коршунова О. В. STEM-освіта. Професійний розвиток педагога : збірник спецкурсів / О. В. Коршунова, Н. І. Гущина, І. П. Василашко, О. О. Патрикєева. К. : Видавничий дім «Освіта», 2018.80 с. ISBN 978- 617-656-972-5.
4. Про затвердження плану заходів щодо реалізації Концепції розвитку природничоматематичної освіти (STEM-освіти) до 2027 року: розпорядження Кабінету Міністрів України від 13 січ. 2021 р. № 131-р. Київ, 2021. https://zakon.rada.gov.ua/laws/show/131-2021- %D1%80#Text (дата звернення: 12.11.2022).