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The Importance of Problem-Based Learning in Teaching Medical Chemistry

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Abstract: This article highlights the didactic and practical significance of applying problem-based learning (PBL) technology in teaching medical chemistry. Problem-based learning fosters students' independent thinking, research skills, and professional competencies, while enabling them to connect theoretical knowledge with practical, real-life examples in medicine.

Introduction

In the modern medical education system, the transition from traditional teaching approaches to interactive and problem-based learning technologies has become a pressing issue. In particular, the subject of medical chemistry requires the integration of theoretical knowledge with clinical practice. In this process, problem-based learning serves as an effective method that enhances students curiosity, analytical reasoning, and cognitive engagement in the learning process.

Main Part

Problem-based learning (PBL) is a pedagogical method that engages students in active thinking and independent reasoning through problem situations intentionally created by the instructor [1]. In medical chemistry, this approach helps learners to deeply understand and apply key theoretical concepts.

For instance, while studying topics such as "Protein Structure and Enzyme Activity," "Acid–Base Balance," and "Electrolyte Solutions," students may be presented with problem-oriented questions such as:

"What medical consequences can occur due to changes in the body's pH?"

"What factors affect enzyme activity?" [2]

These questions encourage learners to analyze problems critically and link theoretical knowledge with practical applications in medical contexts.

Advantages of Problem-Based Learning

1. Develops students' independent thinking and research skills.
2. Connects the subject with medical practice and increases its practical relevance.
3. Enhances analytical reasoning, logical analysis, and evidence-based decision-making abilities.
4. Encourages active participation of learners in the educational process [3].

Hence, the use of problem-based methods in organizing practical lessons significantly increases the effectiveness of the educational process. As medical chemistry is an integrative discipline, explaining chemical laws and processes through real-life situations ensures stronger retention and deeper comprehension among students.

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Methods of Solving Problem Situations

The main methods include:

Research-based method

Inductive method (from specific to general)

Deductive method (from general to specific)

Project and modeling approaches [4]

Tools for problem-solving:

Experimentation

Information analysis

Observation

Modeling

In this approach, the teacher acts as a problem setter, facilitator, and analyst, guiding students toward independent solutions. This enhances learning motivation and helps students consolidate their knowledge effectively.

Example of a Problem Situation

When studying the topic "Toxic Effects of Inorganic Elements,"using problem-based scenarios increases understanding.

For example:

A student named X regularly consumes foods containing excessive amounts of arsenic (As). The daily safe intake is 1 mg, but the student consumes 2–3 mg per day. Arsenic mainly accumulates in erythrocytes, the spleen, and protein tissues. A body content of 0.1–0.3 g may cause death. As(III) compounds (arsenites) inhibit the –SH groups of enzymes and proteins, reducing their activity. Arsine gas (AsH_3) is particularly toxic; it inhibits heme activity, leading to erythrocyte hemolysis, blockage of renal tubules, and jaundice [5].

Based on this situation, the following problem-based questions can be presented:

1. How many days would it take for the student to reach a lethal dose of arsenic?
2. What therapeutic methods are used to treat heavy metal poisoning?
3. What is chelation therapy?
4. For what purpose are antidotes administered?

Experimental Results:

Grade Levels	Practical group	Number of students	Control group		Experimental group	
			Number	%	Number	%
Excellent **Good** **Satisfactory**		24	12 8 4	50 33 17	13 8 3	53 33 14

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Problem-based learning is an effective modern pedagogical approach that enhances the quality of teaching medical chemistry. Through this method, students acquire knowledge not by memorization, but by solving real-life scientific problems. As a result, they develop critical and analytical thinking, scientific reasoning, and professional competence. Furthermore, this approach bridges theoretical chemistry with clinical practice, helping students to make evidence-based decisions in medical contexts.

In summary, implementing problem-based learning in medical chemistry education promotes creativity, analytical skills, and readiness for professional medical practice.

References

1. Karimova, R., & To‘xtayeva, D. Pedagogical Technologies and Innovative Teaching Methods.Tashkent: Fan, 2020.
2. Qodirov, A.Medical Chemistry: A Study Guide.Tashkent: Tibbiyot Publishing, 2021.
3. Ziyayeva, N. Theoretical Foundations of Problem-Based Teaching Technology. Uzbekistan Journal of Pedagogy, 2022.
4. Ixtiyarova, G.A., Bekchanov, D.J., & Ahadov, M.Sh. The Importance of Modern Technologies in Teaching Chemistry. Tashkent, 2020.
5. Alimkhodjayeva, N.T., Suleymanova, G.G., Ikramova, Z.A., & Tadjiyeva, X.S. Medical Chemistry. Part 1. Tashkent, 2024.