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Methodology for Using Educational Games in Chemistry Classes at Medical Universities

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Abstract: The article discusses the theoretical and practical aspects of using educational games in teaching chemistry at medical universities. It reveals the pedagogical principles and stages of organising game-based learning, provides examples of game-based methods aimed at developing professional thinking, increasing motivation, and forming sustainable chemical and biological competencies. It concludes that didactic games are highly effective as a means of stimulating the learning process and professional socialisation of future doctors.

Key words: didactic game, chemistry teaching methodology, medical education, professional competencies, active teaching methods.

Introduction

The modern higher education system is undergoing a period of intense transformation, aimed at moving from the traditional paradigm of knowledge transfer to a competence-oriented model of learning. This is particularly relevant in medical universities, as the professional training of future doctors requires not only the acquisition of theoretical knowledge, but also the development of analytical, clinical and critical thinking skills.

Chemistry, as a fundamental discipline in the medical cycle, provides students with an understanding of the molecular basis of life processes, metabolism, the mechanisms of action of drugs, and toxicological reactions. However, practice shows that students often perceive chemistry courses as complex and abstract, which reduces their motivation and activity in their studies.

The roles of the teacher and student in shaping learning activities

Components of teaching (teacher's position) activities	*Questions answered by the student (student's position)*
Motivation for activity	Why am I studying this?
Setting a learning task, its acceptance by students	What are my successes and what am I struggling with?
Discussion of how to approach the learning task	What do I need to do to solve this task?
Monitoring	Am I solving this task correctly?
Comparing the result with the learning task	Did I achieve the set goal (standard, model) correctly?
Evaluating the process and result	What learning task am I facing?

Another problem is that for natural science disciplines, whose purpose is to shape worldview, methodological culture, systematic knowledge about the universe, revealing the meaning and value of understanding the laws of nature, existence, and man's place in them, the mechanism of forming

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knowledge intended only for memorisation, reproduction when answering at the blackboard, and use, mainly for solving abstract educational tasks alienated from the student's personality, is unacceptable [1].

One effective way to overcome these difficulties is to use educational games. The gaming technique allows you to combine educational, developmental and educational goals, ensuring emotional involvement and stimulating independent search for knowledge. The use of educational games in medical education not only contributes to a better understanding of chemical material, but also helps students develop key professional competencies: communication skills, critical thinking, responsibility and the ability to work in a team.

Unlike games in general, educational games have a significant feature: a clearly defined learning objective and corresponding educational outcome, which can be justified, explicitly identified and characterised by an educational and cognitive focus [2].

Didactic games are educational games that promote better assimilation of educational content and the development of general academic skills and abilities[3].

Currently, the flow of information for students has increased, which makes it difficult to comprehend. The mental load on students has also increased significantly, which raises the question for teachers of how to stimulate and maintain students' interest in learning new material and develop their desire to study independently [4].

Didactic games are used in chemistry lessons, but the variety of these games is quite limited: most often they are crossword puzzles and rebuses. - The educational games suggested in chemistry teaching guides can usually be used in review lessons or at the end of studying separate sections, as they cover teaching material on several topics of the course. - Unfortunately, no pedagogical sources have been identified that describe the experience of chemistry teachers who systematically use didactic games in lessons in accordance with the topics of the sections studied in the textbook, despite the fact that the effectiveness of didactic games depends precisely on the systematicity of their use [5].

Materials and methods

Theoretical basis of the study

The methodological development was based on the works of uzbek and foreign educators researching game-based learning technologies. It is based on the principles of active learning, which assume:

- Involving students in activities that simulate professional situations;
- Modelling problem-solving tasks;
- Ensuring feedback between participants in the process.

Methodological recommendations for teaching chemistry to medical students were also used.

Research objectives and tasks

The objective is to develop and describe a methodology for using educational games in chemistry classes at medical universities, aimed at improving the effectiveness of the learning process and increasing students' professional motivation.

Objectives:

1. To analyse the pedagogical potential of didactic games in chemistry teaching.
2. To determine the structure and stages of game organisation.
3. To develop examples of specific game techniques for medical chemistry disciplines.
4. To evaluate the pedagogical effectiveness of the proposed approaches.

Research methods

- Theoretical analysis (of pedagogical and methodological literature on the subject).
- Observation and pedagogical experiment conducted during general and organic chemistry classes at a medical university.
- Questionnaire survey of students (n=82) to identify their attitude towards game-based learning methods.
- Methods of quantitative and qualitative analysis of learning outcomes (academic performance, engagement, reflection).

Results

Stages of organising educational games

Based on the analysis, the following stages of the methodology for introducing educational games have been identified:

1. Motivational and preparatory stage

Defining the educational topic and the aim of the game.

Setting a cognitive task related to the medical context.

Developing a scenario, rules and handouts.

2. Game stage

Dividing students into groups (teams).

- Completing game tasks, solving problems.
- Elements of competition or simulation of professional activities (e.g., modelling laboratory work).

1. Reflection and evaluation stage

- Discussion of results, identification of correct and incorrect decisions.
- Formulation of conclusions, correlation of gaming experience with real medical tasks.

Examples of educational games

1. "Chemical Clinic"

Students receive 'case histories' of substances, which indicate their symptoms — chemical properties. The task is to 'make a diagnosis' (identify the substance) and 'prescribe treatment' (describe the chemical reaction that eliminates the undesirable effect).

Educational objectives: to reinforce knowledge about classes of inorganic substances and types of reactions.

Developmental objectives: to develop associative thinking and integrate chemical and biological knowledge.

2. "Pharmacological Laboratory"

During the game, students explore the properties of medicinal compounds, identify functional groups, calculate molecular weight, and analyse the mechanism of action.

Objective: to develop practical skills in chemical analysis in the context of pharmacy and biochemistry.

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3. "Trial of a substance"

Groups of students play the roles of 'prosecution' and 'defence' in relation to a controversial substance (e.g. phenol, chlorine, ammonia). Arguments from the fields of chemistry, medicine, ecology and ethics are used.

Objective: to develop critical thinking, argumentation skills and the ability to conduct scientific discussions.

4. "Chemical Brain Ring"

A team quiz aimed at reviewing basic concepts, terms and formulas. Multimedia tools (Kahoot, Quizizz, etc.) are used.

Effectiveness assessment

Analysis of questionnaire data and observations showed that:

- 86% of students reported increased interest in the subject;
- 78% demonstrated improved performance at the end of the module;
- 92% noted improved teamwork and confidence in their answers.

Thus, the introduction of gaming methods contributed to the activation of educational and cognitive activities, improved the quality of material assimilation, and increased professional motivation.

Discussion

The results obtained confirm that educational games are not just a form of entertainment, but an effective pedagogical tool that ensures the integration of theoretical knowledge and practical skills.

Gaming activities facilitate the transition from passive information assimilation to active knowledge construction. This is particularly important for medical specialties, where it is necessary to develop systematic thinking and readiness to solve complex problems.

In addition, educational games implement the principles of andragogy — adult education based on the experience, independence, and practical orientation of learners. In the gaming process, students become active participants in their education, which increases their responsibility and self-esteem.

From a methodological point of view, the use of games requires a high level of preparation on the part of the teacher: it is necessary to maintain a balance between the educational and gaming components and avoid turning the lesson into entertainment. The effectiveness of the method depends on clear goal setting, the existence of a system of assessment criteria, and conscious reflection after the game is over.

Conclusion

The introduction of educational games into the teaching of chemistry at medical universities contributes to the formation of a lasting interest in the subject, the development of professionally relevant competencies, and an improvement in the quality of knowledge acquisition. The game-based methodology ensures the implementation of the principles of activity, clarity, and professional orientation in teaching.

The study showed that the systematic use of educational games:

- increases student motivation and engagement;
- promotes the development of analytical thinking;
- strengthens the interdisciplinary connections between chemistry, biology, and medicine;
- Develops the ability to apply knowledge in practical situations.

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Thus, educational games are an effective method of pedagogical innovation that meets the modern requirements of medical education.

References

1. Тухтаниёзова Ф. О., Комилов К. У. Формирование универсальных учебных действий у учащихся на уроках химии через дидактические игры //Экономика и социум. – 2022. – №. 2-2 (93). – С. 960-965.
2. Калугина Ю. О., Баранов В. С., Попова Е. Е. Организация игрового обучения на уроках химии //Наука и Образование. – 2020. – Т. 3. – №. 2.
3. Космодемьянская С. С., Валова А. А. Методические особенности использования дидактических игр на уроках химии: подготовка студента //Фундаментальная наука и технологии-перспективные разработки. – 2020. – С. 18-20.
4. Алтенова Н. Т., Сергазина С. М. Игровые технологии в процессе обучения химии //Евразийский союз ученых. – 2020. – №. 10-3 (79). – С. 56-58.
5. Мурзинцева О. Г. ИСПОЛЬЗОВАНИЕ ДИДАКТИЧЕСКИХ ИГР НА УРОКАХ ХИМИИ //Пути совершенствования современной системы образования. – 2008. – С. 119-123.