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## THE USING DIDACTIC GAMES AS A TOOL TO INCREASE THE INTEREST OF 7TH GRADE STUDENTS IN STUDYING CHEMISTRY

### *Abstract*

Modern education requires innovative teaching methods that stimulate students' interest in the learning process and encourage active thinking. It is crucial to maintain this interest throughout the school years. One effective approach is the use of didactic games, which make learning more interesting and productive while also contributing to better memorisation of information. Using game technologies to teach chemistry not only promotes the learning of abstract concepts and complex theoretical foundations but also the development of practical skills. From 12 February to 16 April 2025, a pedagogical experiment was implemented in 7B (the experimental group) and 7C (the control group) at the General Education School named after Academician E.A. Buketov № 52 ( Karaganda city). The experiment aimed to develop and test educational games that would improve academic achievement and students' interest in chemistry. 48 students took part in the experiment. In accordance with the curriculum and taking into account the age characteristics of the students, experimental studies were conducted in six lessons using educational games: “Guess the Scientist”, “Chemical Quest”, “Encryption of elements”, “Guess the Element. “Isotope bingo”, “Chemical constructor”, “Molecular detective”, “Secret ingredient”, “Sorting foods”, “Chemical Code” and other.

**Keywords:** didactic games, chemistry, testing, questionnaires, middle school, 7th grade.

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## ДИДАКТИКАЛЫҚ ОЙЫНДАРЫ 7-СЫНЫП ОҚУШЫЛАРЫНЫҢ ХИМИЯНЫ ОҚУҒА ҚЫЗЫҒУШЫЛЫҒЫН АРТТЫРУ ҚҰРАЛЫ РЕТІНДЕ ҚОЛДАНУ

### Аңдатпа

Қазіргі білім беру оқушылардың оқу процесіне қызығушылығын арттыруға және олардың танымдық белсенділігін арттыруға ықпал ететін оқытудың инновациялық әдістерін енгізуді талап етеді. Бұл қызығушылықты сақтау және оны бүкіл мектеп жылдарында сақтау өте маңызды. Тиімді тәсілдердің бірі - дидактикалық ойындарды қолдану. Ол оқуды қызықты әрі нәтижелі, сондай-ақ ақпаратты жақсы есте сақтауға ықпал етеді. Химияны оқытуда ойын технологияларын қолдану абстрактілі ұғымдар мен күрделі теориялық негіздерді игеруге ғана емес, сонымен қатар практикалық дағдыларды дамытуға да қол жеткізеді. 2025 жылғы 12 ақпан мен 16 сәуір аралығында "Жалпы білім беретін мектеп" КММ-де академик Е. А. Бөкетова № 52" Қарағанды қ.7 "Б" (эксперименттік) және 7 "С" (бақылау) топтарында педагогикалық эксперимент іске асырылды. Эксперименттің мақсаты дидактикалық ойындарды әзірлеу және сынақтан өткізу болды, бұл академиялық нәтижелер мен оқушылардың химияға деген қызығушылығын жақсартуға ықпал етті.

Экспериментке 48 оқушы қатысты Оқу бағдарламасына сәйкес және оқушылардың жас ерекшеліктерін ескере отырып, дидактикалық ойындарды: "Ғалымды тап", "Химиялық квест", "Элементтерді шифрлау", "Элементті тап". "Изотоптық лото", "Химиялық конструктор", "Молекулалық детектив", "Құпия ингредиент", "Өнімді сұрыптау", "Химиялық код" ж.б. еңгізіп алты сабақта эксперименттік зерттеулер жүргізілді.

**Түйін сөздер:** дидактикалық ойындар, химия, тестілеу, сауалнама, орта мектеп, 7-сынып.

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## ИСПОЛЬЗОВАНИЕ ДИДАКТИЧЕСКИХ ИГР КАК СРЕДСТВА ДЛЯ ПОВЫШЕНИЯ ИНТЕРЕСА УЧАЩИХСЯ 7-ГО КЛАССА К ИЗУЧЕНИЮ ХИМИИ

### Аннотация

Современное образование требует внедрения инновационных методов обучения, способствующих повышению интереса учащихся к учебному процессу и активизации их познавательной деятельности. Крайне важно сохранить этот интерес и поддерживать его на протяжении всех школьных лет. Одним из действенных подходов является применение дидактических игр, которые делают обучение более интересным и продуктивным, а также способствуют лучшему запоминанию информации. Использование игровых технологий в преподавании химии содействует не только усвоению абстрактных концепций и сложных теоретических основ, но и развитию практических навыков. В период с 12 февраля по 16 апреля 2025 года в КГУ «Общеобразовательная школа им. Академика Е.А. Букетова № 52» ( г. Караганда) был реализован педагогический эксперимент в 7 «Б» (экспериментальная группа) и 7 «С» (контрольная группа). Целью эксперимента была разработка и апробация дидактических игр, способствующие улучшению академических результатов и интереса учащихся по химии.

В эксперименте приняли участие 48 учеников. В соответствии с учебной программой и с учетом возрастных особенностей учащихся проведены экспериментальные исследования на шести уроках с использованием дидактических игр: "Угадай ученого", "Химический квест", "Шифрование элементов", "Угадай элемент". "Изотопное лото", "Химический конструктор", "Молекулярный детектив", "Секретный ингредиент", "Сортировка продуктов", "Химический код" и другие.

**Ключевые слова:** дидактические игры, химия, тестирование, анкетирование, средняя школа, 7 класс.

**Introduction.** Recently, schoolchildren have become less interested in the natural sciences, including chemistry. This is largely due to the subject's complexity, which demands advanced abstract thinking and the memorisation of large amounts of information. It is therefore imperative to use effective teaching methods that will engage and inspire students. One such method is didactic games. These games make learning more exciting and dynamic, stimulating interest in the subject and encouraging logical and creative thinking when solving problems. Games can also help to reduce fear of complex topics and increase confidence in one's abilities. Educational games are particularly well-suited to chemistry, as they enable students to grasp complex concepts through practice, teamwork and problem-solving. It is important to note that modern schoolchildren are accustomed to digital technologies. In the era of gamification, traditional teaching methods often lose out to interactive formats. Using educational games enables teaching to be adapted to modern realities, making it more engaging and effective. Well-organised gaming technologies in chemistry lessons can improve learning outcomes and boost enthusiasm for studying. Educational games can be used to introduce new material and reinforce learning, making them a versatile teaching tool. In this regard, developing and using educational games in the classroom appears to be an important and timely task [1; p. 173].

In this paper, we argue that didactic games are an effective primary teaching technique for fostering learning, especially in post-pandemic times. Didactic games, which organizes teaching to help learners acquire knowledge and skills through well-planned didactic resources. Traditionally, the game sought to restructure established teaching practices, and research indicates that didactic games enhance students' internalization of instructional material and academic performance.

The theoretical landscape regarding didactic games is multifaceted, spanning from classical pedagogical thought to modern neuro-educational perspectives. Historically, K. Capps characterized the game as a fundamental method for comprehending reality, guided by internal volitional forces that allow a learner to assimilate the extensive foundations of human culture rapidly [2; p. 518]. This sentiment resonates with the legacy of V.A. Sukhomlinsky, who posited that intellectual development is inconceivable without play. He famously described play as a "bright window" through which a life-giving stream of concepts enters a child's spiritual world, acting as a spark that ignites inquisitiveness. Similarly, A.S. Makarenko emphasized the pragmatic utility of role-playing, viewing it as a sophisticated instrument for fostering willpower, communal responsibility, and practical skill acquisition, asserting that play is as vital in childhood as professional activity is in adulthood [3; p. 173].

In the digital age, the discourse has shifted towards cognitive development. H. Jenkins expanded the definition of play beyond mere entertainment, identifying it as a "ninth wave of development" and a fertile environment for cultivating complex mental abilities [4; p. 47]. Contemporary research further reinforces these classical views. For instance, Su and Cheng demonstrate that gamified mobile systems significantly enhance both learning motivation and academic achievement by providing immediate feedback and reducing anxiety [5; p. 272]. Furthermore, Abdelmagid et al. argue that integrating interactive AI-driven games facilitates "cognitive depth," moving beyond simple recall toward higher-order thinking skills such as analysis and evaluation [6; p. 322].

Didactic games represent a structured pedagogical form that operationalizes the principles of active learning. Unlike spontaneous play, these activities are distinguished by specific educational objectives, rigorous rules, and a systematic assessment framework. Plass et al. [7; p. 154] emphasize that the effectiveness of such games lies in their ability to manage the cognitive load of the learner, balancing challenge with support to maintain a state of "flow". While gaming was once relegated to extracurricular settings, it is now recognized as a cornerstone of formal primary education, particularly in promoting the harmonious growth of intellectual faculties.

The cognitive impact of didactic games is profound. The inherent competitive element compels students to cultivate attentiveness, discipline, and the ability to categorize information. Through these activities, learners refine their capacity for synthesis and generalization skills that are critical for scientific literacy. Recent studies by Liu [8; p. 412] highlight that context-based didactic games in science education help students bridge the gap between abstract theoretical knowledge and daily lived

experiences, thereby increasing the perceived relevance of the subject. Moreover, Bortnik et al. [9] 154 observe that virtual and game-based simulations in chemistry education foster research-oriented skills that traditional rote learning cannot replicate.

Specifically, didactic games serve as a catalyst for:

- Stimulating memory, perception, and imagination through structured challenges;
- Encouraging children to observe, compare, and classify objects within a controlled environment;
- Fostering integrity, teamwork, and the ability to adhere to complex rule sets.

Modern pedagogy dictates that a successful didactic game must integrate several core components: a clearly defined learning objective, an engaging narrative or "game idea," restrictive rules to guide behaviour, specialized materials (visual aids, cards, or digital interfaces), and a final result that allows for an objective assessment of success [10; p. 430]. Ultimately, as noted in recent literature, the goal is not merely the acquisition of isolated facts but the development of a flexible mindset capable of applying knowledge across diverse situational contexts [11; p. 490].

*Basic provisions.* The study substantiates the methodological efficacy of integrating a structural complex of didactic games into the 7th-grade chemistry curriculum, specifically designed to facilitate the comprehension of abstract concepts within the 'Initial Chemical Concepts' module. It was empirically demonstrated that the systematic application of game-based technologies transforms the mastery of chemical language (symbols, formulas, valence) from rote memorization into an active cognitive process, significantly reducing the initial psychological barrier for novice learners. The comparative analysis of the results of the pedagogical experiment (N=48) revealed a significant difference between the use of gamified educational environments and increased student engagement, resulting in a measurable improvement in academic quality and retention rates compared to traditional instruction methods.

**Material and methods.** A step-by-step approach was employed in the development of didactic games focused on the subject of chemistry. The key stages of didactic game development are as follows:

1. Formulation of educational objectives. At this stage, it is necessary to clearly define the specific chemical knowledge and skills that should be conveyed to students through the game. The educational objectives can be diverse:

- learning theoretical knowledge (e.g. the structure of the atom or the classification of chemical reactions);
- improving practical skills (e.g. learning how to write chemical formulas correctly);
- developing research skills;
- developing the ability to apply the acquired knowledge in non-standard situations.

2. Selecting the content of the game. The content should be based on the chosen topic and learning objectives. It is important that the material is understandable for students of a certain age and corresponds to their current level of knowledge. Game tasks should combine informational value with an entertaining aspect to activate cognitive functions and maintain engagement [12; p. 223].

3. Establish the format of the game. The format chosen depends on the educational objectives and the age of the participants. Examples include card games, board games, role-playing games, quests and online games using ICT [13; p. 107].

4. Developing the game scenario. At this stage, the game's rules are formulated, its stages are sequenced, its tasks are developed, and its evaluation criteria are determined. It is important to introduce elements that encourage active participation, foster a sense of healthy competition, and give players the opportunity to make independent decisions [14; p.100].

5. Development of game resources and materials. All the necessary components are prepared at this stage, including game boards, cards and tables, as well as electronic applications and presentations. If necessary, multimedia elements to accompany the game visually and aurally are selected [15; p.1455].

6. Realisation of the didactic game. The game is realised according to a pre-prepared plan at this stage. The teacher acts as a facilitator, directing the process, monitoring compliance with the rules, supporting students if they encounter difficulties and maintaining a positive attitude.

7. Summing up and analysing the results. After the game, the students share their emotions, what they found difficult, and what they learnt in a discussion. The teacher summarises the results, evaluates each student's contribution, celebrates successes, and identifies areas for improvement. They also analyse how effectively the game achieved the learning objectives and how actively the students participated [16; p. 157].

From 12 February to 16 April 2025, a pedagogical experiment was implemented in 7 “B” and 7 “C” grades at the General Education school named after Academician E.A. Buketov (Karaganda). The experiment aimed to develop and test educational games that would improve academic achievement and students' interest in chemistry. The 7 “B” grade (23 students) acted as the experimental group, where learning was carried out using game methods. The 7 “C” grade (25 students) acted as the control group, where lessons were conducted mainly in the traditional format using textbooks, workbooks, and standard teaching aids. A total of 48 students took part in the experiment. The school's technical equipment made it possible to use handouts and demonstration materials, as well as ICT, in-game lessons. The content of the chemistry lessons conducted within the framework of the experiment is presented in Table 1.

Table-1. Calendar and thematic planning in chemistry in grades 7 “B” and 7 “C”

№	Chapter	Topic	Data
1	The periodic table of chemical elements	The history of the creation of the periodic table of chemical elements	12.02.25.
		The structure of the periodic table	19.02.25.
2	Relative atomic mass. The simplest formulas	Relative atomic mass	05.03.25.
		The valence. Chemical formulas. Relative molecular weight	12.03.25.
3	Chemical elements and compounds in the human body	Nutrients in the composition of food	02.04.25.
		Chemical elements in the human body	09.04.25.

During the experimental study, six lessons covering three chapters were conducted, with different didactic games organised that corresponded to the topics of the chemistry curriculum and took the age characteristics of the students into account.

The first lesson included games such as: “Guess the Scientist”, in which students used cards to match scientists with their achievements. This game aims to develop logical thinking and the ability to make comparisons and also tests knowledge of the discoveries of Deubereiner, Newlands and Mendeleev. In the game “The history of chemistry” (believe – don't believe), different propositions were read out, and students stood up if they believed the proposition or sat down if they did not. This game tested students' knowledge and developed their critical thinking and attentiveness. In the game “Guess the crossword puzzle”, students worked with scientific terms. Students learnt to apply their knowledge in practice, which helped them to understand the material better. In the game “Chemical Quest: in search of the periodic table”, students completed tasks in a maze and answered questions. This game developed logic and attention.

In the second lesson, the following games were used: In “Encryption of elements” students deciphered the names of chemical elements. This game aimed to develop attention to detail and knowledge of the symbols of chemical elements. In the game “Crosses and Zeros”, students worked in pairs to answer questions on a table. This game developed pupils' communication skills, logical thinking and reaction speed. In the game “Who am I?”, students had to identify a chemical element from a card by asking questions. This game stimulated my analytical skills and deepened my knowledge of the properties of elements. In the game “Pick an Extra”, student improved their ability to analyse and classify elements of the periodic table by excluding an inappropriate element from the group.

In the third lesson, the focus was on games based on numerical data and logic. In the game “Guess the Element”, students identified the element by its relative atomic mass and memorised these values more effectively. In the game “Who's Faster?”, students had to quickly identify an element by its relative atomic mass, which developed their reaction speed and promoted memorisation. “Isotope bingo” helped students understand the concept of isotopes and taught them to compare elements by mass.

The fourth lesson focused on formulae and calculations involving chemical elements. Games such as: “In guess the formula”, students deciphered the composition of substances. This developed their ability to read formulas and recognise symbols. In the game “Chemical constructor”, students created formulas according to valences, developing an understanding of valences and learning to create formulas. In the game “Molecular detective”, children calculated molecular masses and developed calculation skills and the ability to work with the table. The game “Express-question” involved rapid-fire questions on valence, helping to consolidate knowledge of valence and the relative molecular masses of chemical elements.

In the fifth lesson, a game was played to make the students more aware of what they eat and what it consists of. In the “Secret ingredient” game, the students had to guess the name of a food from its description. This promoted an understanding of the roles of proteins, fats, carbohydrates and vitamins. We also played the game “Sorting foods”, in which students distributed cards according to nutrient type and classification, testing their knowledge. In the “Analysing food composition” game, students filled in tables and worked with information about foodstuffs. The children learnt to identify the nutrients in certain products. In the “Healthy plate” game, the students created a balanced menu. This game helped them to apply their knowledge in practice. This game also contributed to their knowledge of how to eat properly in everyday life.

The sixth lesson included games such as: “Chemical Code”, in which formulas were displayed and questions about them were asked. This helped distinguish between and consolidate knowledge of chemical elements. In the “Find and write down” game, students selected from the list only the elements found in the human body. This helped them to learn about the micro- and macro-elements of the human body. In the “Assemble the organism” game, students correlated elements according to their role in the human body using cards. They recognised and distinguished the functions of elements in the body. In the “Search for elements” game, students circled the macronutrients and squared the micronutrients from the list of elements. This helped them to organise and differentiate between their knowledge of micro and macro elements. In “Travelling through the world of elements”, the children answered questions about chemistry in the human body using all that they had learnt in the lesson.

**Results and Discussion.** *1. Results of the test.* During the pedagogical experiment to assess the effectiveness of using didactic games to teach chemistry, three tests were conducted in both the experimental and control classes after they had studied separate sections of the curriculum. Each test was conducted after a topic had been completed. All 23 students in 7 “B” (experimental group) and all 25 students in 7 “C” (the control group) participated in all tests. The results of the three tests conducted with the experimental class are shown in Diagram 1.

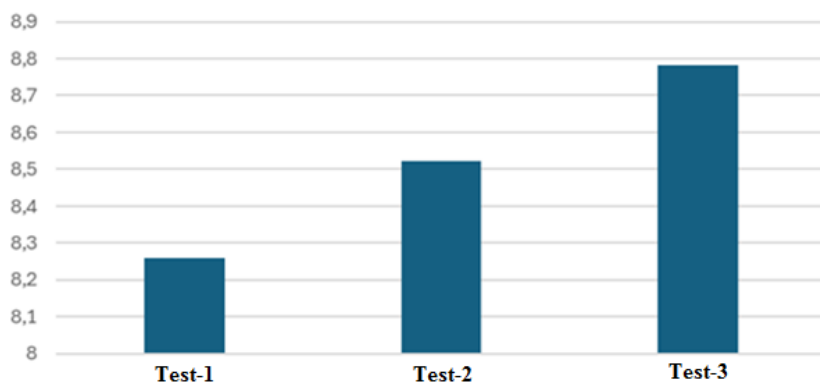


Diagram-1. Results of three tests in the experimental class

The first test was conducted after “The periodic table of chemical elements” chapter. According to the results, 47.8% of students achieved an “excellent” score (9–10 points), 47.7% achieved a “good” score (7–8 points) and 4.5% achieved a “satisfactory” score (6 or below). The average score was 8.26 out of a possible 10. It was noted at this stage that students oriented themselves more quickly to the groups and periods of the periodic table, which indicates the success of the game method.

The second test was conducted after studying the chapter “Relative atomic mass”. “The simplest formulas”. According to the results, 52.2% of students achieved an “excellent” score (9–10 points), 47.8% achieved a “good” score (7–8 points). The average score was 8.52 out of 10. Introducing the “Molecular detective” game enabled students to memorise chemical formulas and their relative molecular masses more effectively. Compared to the initial testing, an increase in the number of correct answers was observed.

The third test was conducted after the chapter on “Chemical elements and compounds in the human body”. According to the results, 60.9% of students achieved an “excellent” score (9–10 points), 39.1% achieved a “good” score (7–8 points). The average score was 8.78 out of 10. When the game “Sorting products” was used, students successfully completed the test and achieved the best results.

Thus, analysis of the results from the three stages of testing in the experimental group, where the didactic games method was employed, revealed positive progress in mastering the curriculum. There was statistically growth in the average score: from 8.26 at the first stage to 8.78 at the third stage. The results of the three tests for the control class are shown in diagram 2.

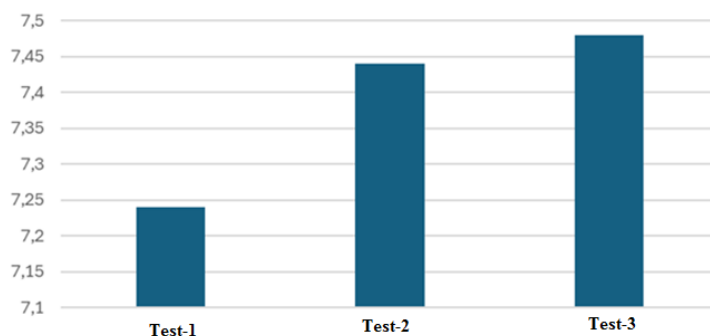


Diagram- 2. Results of three tests in the control class

The first test was also conducted after the chapter “The periodic table of chemical elements”. According to the results, 16.0% of students achieved an “excellent” score (9–10 points), 56.0% achieved a “good” score (7–8 points) and 28.0% achieved a “satisfactory” score (6 or below). The average score was 7.24 out of 10.

The second test was conducted after studying the chapter “Relative atomic mass. The simplest formulas”. According to the results, 20.0% of students achieved an “excellent” score (9–10 points), 60.0% achieved a “good” score (7–8 points) and 20.0% achieved a “satisfactory” score (6 or below). The average score was 7.44 out of 10, which is higher than in the first test.

The third test was conducted after studying the chapter “Chemical elements and compounds in the human body”. According to the results, 19.5% of students achieved an “excellent” score (9–10 points), 60% achieved a “good” score (7–8 points) and 20.5% achieved a “satisfactory” score (6 or below). The average score was 7.48 out of 10.

Analysis of the results from the three testing stages in the control class showed that teaching in the traditional format only promotes a moderate increase in learning achievement. The average score increased by a small amount: from 7.24 at the first stage to 7.48 at the third stage. Therefore, in the control class, there is a slight increase in the average score as topics are learnt. However, unlike in the experimental class, these improvements are less noticeable, and the proportion of students achieving low scores remains the same. The study found that the average performance in the experimental class

(8.52 points) was significantly higher than in the control class (7.38 points) (diagram 3). The difference of 1.14 points between the mean values indicates a significant increase in academic achievement in the experimental group.

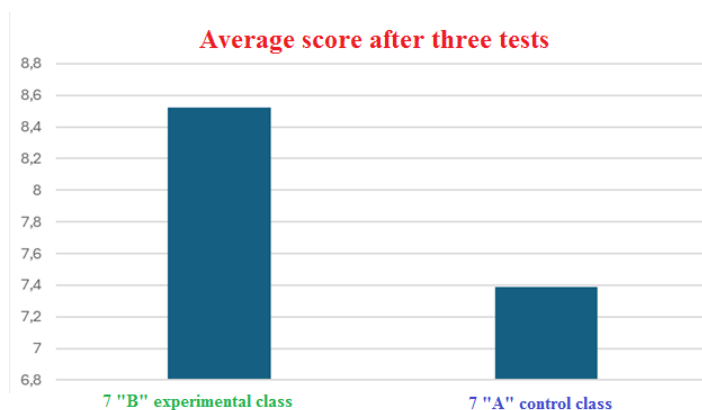


Diagram- 3. Comparison of the results of the average scores of the experimental and control groups

This difference highlights the effectiveness of the methods employed in the experimental class, which led to better learning outcomes than traditional approaches.

2. *Questionnaire results.* A questionnaire was completed by students in the experimental class before and after lessons involving didactic games. The questionnaire consisted of 10 questions with three answer options: “agree”, “disagree” and “neutral”.

1. Do you enjoy chemistry lessons that use didactic games?
2. Do you find it easier to understand the learning material?
3. Have you become more interested in chemistry since you started using games?
4. Do you actively participate in class during these games?
5. Do you find it easier to remember information after playing the games?
6. Do you feel comfortable working with the activities and materials in the games?
7. Did you have any difficulty completing the game tasks?
8. Would you like to continue studying chemistry using didactic games?
9. Do you think didactic games increase motivation to learn?
10. Do you think that didactic games make chemistry lessons more exciting?

The results of the entrance questionnaire are presented in diagram 4.

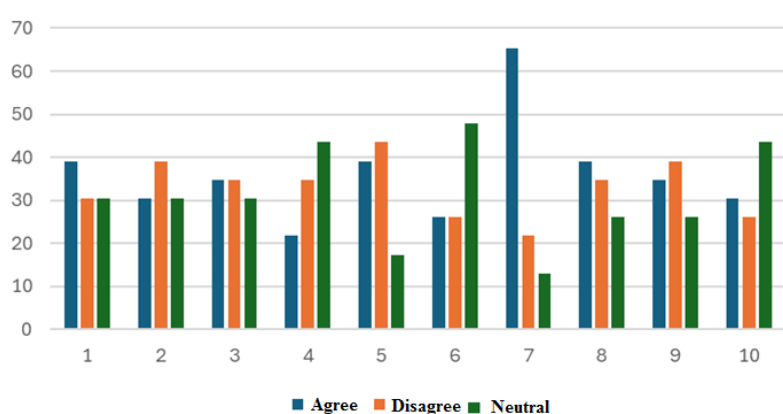


Diagram-4. Results of the questionnaire before the experiment

Analysing the results of the questionnaire conducted before the introduction of didactic games into the teaching process enables us to draw a generalised conclusion about students' perceptions of this

teaching method, their expectations, and the potential challenges associated with its implementation. Overall, the results reveal a mixed attitude among students towards didactic games, ranging from neutral to sceptical. This attitude is primarily due to a lack of experience and uncertainty regarding expectations, as well as the need to adapt the new format to the level of class preparation.

Firstly, the results reveal considerable uncertainty among students regarding the potential of didactic games. The high percentage of “neutral” answers (ranging from 13.04% to 47.83% for different questions) indicates a lack of clear understanding of the format and influence of game-based learning methods. This is due to a lack of experience in participating in such groups. This is evident, for example, in the responses to the sixth question, where 47.83% of respondents found it difficult to evaluate the suitability of the game format. The same is true of the fourth and tenth questions, where 43.48% of respondents chose a neutral position. This uncertainty highlights the importance of preparing students in advance, including explaining the purpose, structure and benefits of didactic games, to help them develop clearer expectations.

Secondly, the questionnaire survey reveals that some students are only moderately interested in the game approach. Depending on the question, approximately 30-40% of respondents express a positive attitude towards didactic games, recognising their potential to increase interest in chemistry lessons (question 8, 39.13%) and improve learning (question 5, 39.13%). This suggests that some students are willing to experiment with new forms of learning and view them as an opportunity to make lessons more engaging. However, this interest is not widespread, as a significant proportion of students (34–43%, depending on the question) express doubts or a negative attitude, possibly due to a lack of examples of the successful application of gaming methods, or negative experiences in ineffective lessons (Question 9: 39.13% 'Disagree').

Thirdly, the results emphasise the existence of barriers related to the perception of didactic games. A significant proportion of students (65.22% in question seven) anticipate difficulties when using the game format, potentially due to a lack of confidence or understanding of the task structure, or an unsuitable level of difficulty. This is confirmed by the answers to questions two and four, where 39.13% and 34.78% respectively noted difficulty comprehending the material or a lack of activity. Therefore, when introducing didactic games, it is important to adapt them to the student's level of preparation, provide step-by-step explanations of the tasks, and create a supportive environment to minimise apprehension and maximise engagement.

After didactic games were introduced in chemistry lessons, a repeated questionnaire survey was conducted among pupils in the experimental class. The results of this questionnaire are presented in diagram 5.

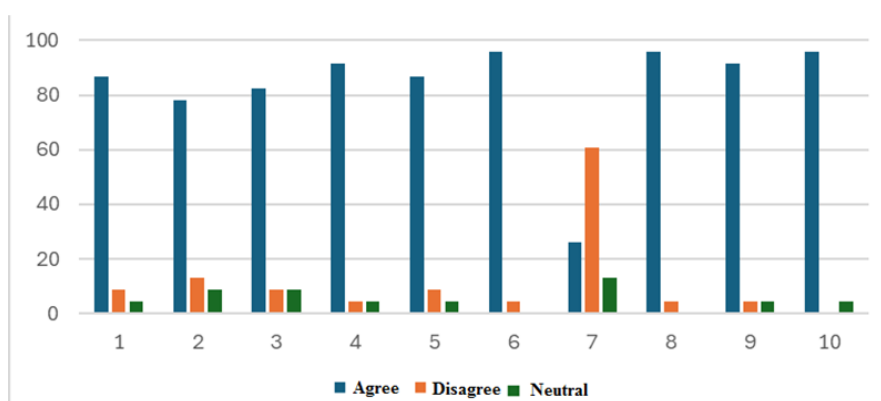


Diagram-5. The results of the questionnaire after the experiment

Analysing the results of the questionnaire conducted after didactic games were introduced into the learning process allows us to conclude that this approach is highly efficient and in demand when teaching chemistry. The data indicate a positive impact of game-based learning on student engagement, understanding of the subject matter, and emotional attitude towards the subject.

The main conclusion is that didactic games are an excellent tool that has transformed students' perception of the learning process. The vast majority of respondents (86–95% for most questions) expressed a positive attitude towards the game format, noting its contribution to increasing interest in chemistry (82.61%), improving comprehension (78.26%) and memorisation (86.96%), as well as increasing engagement (91.30%) and emotional comfort (95.65%). These results emphasise that didactic games facilitate the learning of complex academic content and create an attractive, motivating educational environment, which is particularly important for a traditionally difficult subject. The high level of agreement with statements about the desire to continue using game elements (95.65%) confirms the long-term demand for this approach.

Another important point is that didactic games effectively overcome the barriers associated with traditional teaching methods. The almost complete absence of neutral or negative responses (with only 0–8.7% of respondents selecting “disagree” or “neutral” for most questions) suggests that the game format is widely perceived as accessible and comfortable. This is supported by responses to questions six and ten, in which 95.65% of respondents found the game tasks comfortable and attractive. These results suggest that didactic games successfully adapt to students' needs, striking a balance between educational objectives and emotional engagement.

However, the questionnaire also revealed areas that require attention. Question seven revealed that 26.09% of students found the game tasks difficult, while 60.87% managed without problems. This suggests that, despite the approach's overall success, some tasks or instructions may be unclear or too challenging for certain students. These difficulties are probably related to the level of training or the lack of clarity in the explanations provided. These findings emphasise the need to further refine the game elements by simplifying the instructions, differentiating the tasks according to difficulty level, and providing additional support for students who are struggling.

Ghasemi et al. [13], Huang et al. [14], Tan and Hew [15] stated, that didactic games in chemistry teaching can be used at different stages of the lesson, helping students to learn new material, consolidate knowledge, evaluate their progress and repeat what they have learnt. Properly selected games help students to grasp complex chemical concepts better, develop both subject knowledge and universal learning actions, and increase their interest in the subject. Although the use of games in chemistry teaching is associated with some difficulties, they are quite surmountable. The introduction of game technologies in chemistry teaching involves substantial preliminary work on the part of the teacher, including the creation of the necessary teaching materials and careful design of the game scenario. It is important to realise that not all topics are equally well suited for gamification. For example, traditional methods may be more effective for conducting laboratory work or solving problems that require mathematical calculations. Nevertheless, with a sufficient level of methodological competence, these difficulties can be overcome.

**Conclusion.** The use of didactic games has become an integral part of effectively conducting a chemistry lesson. The experimental part of the study was conducted at the General Education School named after Academician E.A. Buketov № 52, involving two classes: 7 “B” experimental group, where chemistry lessons incorporated game activities, and 7 “B” control group, where lessons were conducted in the traditional format. The level of knowledge assimilation among the students was then compared. Various didactic chemistry games were developed and implemented during the research, such as “Guess the scientist”, “Who am I?”, “Chemical quest: In search of the periodic table” as well as logical tasks and crosswords.

The results of the pedagogical experiment indicate a positive impact of didactic games on learning educational material effectively. In the experimental group, where game-based methods were introduced, there was a significant improvement in knowledge quality compared to the control class, which used traditional teaching methods. On average, students in the experimental class achieved 8.52 points, while those in the control class achieved 7.38 points. These results demonstrate the effectiveness of didactic games as a teaching method.

The questionnaire survey has shown that students have a positive attitude to game forms of teaching. More than 87% of surveyed students noted that games make classes more interesting and

understandable, and also noted that it is during games that they learn and memorise learning material better. It is fair to say that didactic games have considerable potential in chemistry. They dispel the myth that chemistry is a 'difficult' or 'boring' subject. Well-organised games make this academic subject more accessible and exciting, and even popular among schoolchildren. Students begin to conquer their fear of making mistakes, actively participating in discussions, experiments and explorations to find solutions, allowing them to truly learn. It is especially important to note that game methods have a significant impact on students with different levels of preparation - they contribute to the creation of a comfortable educational atmosphere where each child can show his or her abilities, and reduce anxiety before difficult topics and tasks. In addition, such games promote the development of 'soft' skills, such as teamwork, decision-making, consideration of others' opinions and the ability to justify one's point of view — all of which are of particular importance in today's world. Thus, didactic games become a valuable tool for mastering educational material and for developing students' personal and communication skills.

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