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INTRODUCTION OF DIDACTIC GAMES IN THE EDUCATIONAL PROCESS

ABSTRACT

The **relevance** of the introduction of didactic games into the educational process consists of modern, effective methods of stimulating pupils' educational and cognitive activity, equipping them with new knowledge, skills, and preparing students for independent life. The use of didactic games in the study of mathematics in elementary school is one of the methods of activating the cognitive activity of students during learning. In reality, didactic games are rarely used in mathematics lessons.

The **purpose** of the article is to substantiate the concept of didactic game and its peculiarities in teaching mathematics.

Research Methods: terminological analysis to interpret key research definitions; generalization of scientific sources for determining directions of development and application of didactic games in the educational process.

Results. The article substantiates the use of didactic games in mathematics lessons for acquainting pupils with new material, for its consolidation, for repeating previously acquired ideas and concepts, for a fuller and deeper understanding of their learning, formation of computational skills, and formation of outlook. It has been shown that the systematic use of games increases the effectiveness of learning. Lessons of generalization and systematization of knowledge give the greatest opportunities for introduction of game elements in educational process of mathematics.

The peculiarities of conducting a mathematics lesson in the 7th grade during the study of the theme "Identical transformations of whole expressions" using didactic game are considered.

The **conclusions** are drawn that in the process of didactic game, pupils learn to solve problems, to compare and summarize, to make their own conclusions and to justify them, to prove their own opinion. Use of didactic games at different stages of the lesson is a good and effective way of activating pupils' educational and cognitive activity, which has a good effect on improving the level of knowledge in mathematics, the development of mental activity.

KEY WORDS: didactic game, mathematics, educational process, game activity, teaching method.

INTRODUCTION

Modern education requires new methods and means of organizing training and education. This would contribute to the formation and development of the student in conjunction with the natural and social environment, the ability to adapt to changing life circumstances quickly.

Use of didactic games contributes to the purpose of teaching mathematics and the implementation of personality-oriented learning.

The relevance of the introduction of didactic games in the educational process lies in modern, effective methods of stimulating learning and cognitive activity of students, equipping them with new knowledge, skills and abilities, preparing students for independent life.

The use of didactic games when studying elementary school mathematics is one of the methods of activating the cognitive activity of students. In reality, didactic games are rarely used in practice in mathematics lessons.

Analysis of recent research and publications. Many works on pedagogy and psychology are devoted to the problem of using of didactic games in the educational process. Outstanding teachers P. Blonsky, A. Makarenko, V. Sukhomlynsky V. Soroka, G. Rocinsky, C. Shchatsky and others dealt with this issue. The practical application of didactic games in the educational process is covered in the works of M. Clarin, V. Kovalenko, O. Mykytyn, M. Perov, L. Sukharev and others [3-6; 12-13].

Psychologists have identified a significant number of pedagogical ideas about the child's play activities in the results of psychological research. Such psychologists as D. Elkonin, A. Leontiev, and others dealt with the problem of the game.

Famous Soviet teacher and writer, A. Makarenko, made a significant contribution to solving the problem of gaming activity. He noted that play is important in the life of every child. What a child is in the game, such a child will be at work when she grows up. Therefore, the education of the future figure takes place first of all in the game [7].

Analyzing the thoughts of the teacher, it can be considered that the game is the key to the organization of training and education. The game reveals the individual qualities, the abilities of each student best of all.

The outstanding German teacher F. Froebel has studied the influence of games on the education and upbringing of children. He was the founder of the first kindergartens. Their purpose was to teach and educate children based on the development of natural abilities. Training in such kindergartens is based on a system of games with a certain didactic material, which was called "Froebel's Gifts". These were objects of different shape, color, size and mode of action. For example, balls of different colors, balls of different shapes and colors, and a cube made of 8 cubes, and so on. First of all, such material is educational material, which is used in our time [11].

There are various approaches to the interpretation of the concept of "didactic game" in the modern scientific literature. It is characterized by scientists as a means, method and form of learning.

In particular, Y. Babansky considers the didactic game as a valuable method of stimulating interest in learning and as a means of arousing interest in learning [1].

Positive pedagogical experience of using didactic games in the educational process is reflected in the works of G. Korobska, T. Ryseva, O. Savchenko, Y. Fedusenko [8]. In these works the didactic aspects of the use of didactic games in general secondary education institutions have been analyzed.

The author O. Khoma notes that in the educational process the activity of students should be focused on the form of game situations, game reception, and game exercise. All these forms of activity are aimed at solving program issues, mastering specific material and make it possible to facilitate the process of obtaining knowledge [2].

The purpose of the article is to substantiate the concept of didactic game and its features during the study of mathematics.

The objectives of the study are: 1) characteristics of the main definitions of the concept; 2) highlighting the features of the structural elements of the didactic game; 3) a description of the didactic game at a math.

RESEARCH METHODS

The following methods were used to obtain the results: terminological analysis to interpret key definitions of the study; generalization of scientific sources for determining the directions of development and application of didactic games in the educational process.

RESULTS AND DISCUSSION

The game is the subject of many disciplines, namely: ethnography, history, psychology, pedagogy. The game has been used in education quite a long time about 50 thousand years ago. That's when people began to operate with specific geometric shapes. About 4 thousand years ago, people have learned to perform basic arithmetic operations. At the same time, the first games related to mathematics have appeared. For example, the game (XVIII century BC) "Who will be the first to cut a single square into 12 triangles and four squares that are equal in size?" [4].

Didactic game is focused on the development of children's needs for knowledge, intense interest, the formation of cognitive skills and abilities.

Didactic games in education and upbringing of children of all age categories are used for activation of cognitive activity, for repetition, specification, solidification of the received knowledge. Often didactic games with didactic material are the main means of education and training, through which the teacher teaches the child to perceive the world correctly.

Didactic game as a method of teaching is considered in two cases:

- Didactic game, as an element of the lesson is used at a certain stage of the lesson. For example, it can be used during the actualization of basic knowledge.

- Lesson-game. The leading role in such a lesson is given to the teacher, who is the organizer of the game. During such lessons students learn the necessary knowledge, certain skills are formed, and psycho physical cognitive processes such as perception, imagination, thinking and speaking are developed.

Didactic game as an independent game activity is possible only under the certain conditions. Such conditions are the availability of didactic tasks for students' perception, their interest in the game, their mastery of rules and game actions, which depend on the level of game experience. Such prerequisite is using the acquired knowledge about objects and phenomena of the surrounding world by students.

The didactic game has the following structural elements (fig. 1) [Ошибка! Источник ссылки не найден.].



Figure. 1. Structural elements of the didactic game

The purpose of the didactic game is a set that connects the purpose of the teacher and students and consists of educational and game purposes. During the organization of didactic games at the classroom, the teacher embodies the main pedagogical goal, namely, educational, developmental and diagnostic.

The content of the didactic game is based on the content of the learning process and is aimed at the student's cognition of the world around him, on mastering certain methods of educational and cognitive actions according to additional tasks, as well as on the formation of certain moral values.

The plot (script) of the game is a detailed presentation of the content of the didactic game and a description of the sequence of player's actions, the expected results. The plot of the game can be presented in verbal or graphic form (in the form of a scheme, algorithm).

Rules of the game are the basic positions, which reflect the essence of the game, the ratio of all its components.

Game tools are material and ideal objects used by teachers and pupils during the game.

Game actions are actions of players that cannot be determined and calculated in advance, they are not algorithmic, as they are not dictated by strict rules, but only by the imagination of pupils in the created game situation. The conditionality of the game space liberates the players. They are not afraid to inflict any practical damage on themselves and their partners in the game. This is a structural element of the didactic game.

Assessment shows the pupil his progress in the study of a particular discipline, section or topic.

The result of the game is certain results, specific achievements of game actions at performance of the educational task.

All elements of the didactic game form a single whole, providing the game essence of the educational process. Their structure is the basis for considering various types of didactic games.

Didactic games in mathematics lessons can be used to acquaint children with new material, to consolidate it, to repeat previously acquired ideas and concepts, for a fuller and deeper meaningful mastery, the formation of computational, graphical skills and abilities, the development of basic thinking techniques, broadening an outlook. Systematic use of games increases the effectiveness of learning. Didactic games are selected according to the program [10].

The games get along well with traditional learning. The inclusion of elements of the game in the lesson makes the learning process interesting, creates a working mood of children, and facilitates overcoming difficulties in the assimilation of educational material.

Various game situations, with the help of which one or another mental task is solved, support and stimulate pupils' interest in mathematics. Lessons of generalization and systematization of knowledge give the greatest opportunities for introduction of game elements in educational process of mathematics.

Introduction of didactic game in teaching mathematics is a multilevel process that includes conceptual (development of conceptual apparatus, statement of educational task, choice of game form, time of its holding), operational (types of educational game, consideration of game goal, production or choice of visualization, determination of a place in the educational process) and technical (development of instructions that should ensure the correct management of pupils' activities in mathematics lessons using didactic games) levels of implementation [14].

Researchers identify six main groups of conditions for the effectiveness of teaching didactic games in primary school mathematics lessons:

- 1) conditions that ensure the formation of social and cognitive activity as key personal characteristics of the pupil;
- 2) conditions that ensure the development of pupils' independence: dialogic organization of activities during the game, the presence of final and intermediate results at different stages of the game, the variability of the choice of tasks and initial conditions;
- 3) conditions that ensure the development of the ability to self-realization and self-regulation of pupil's learning activities during the game;
- 4) conditions that ensure the harmonious individuality of the adolescent's personality; appropriate relation of figurative and logical components of thinking, the level of cognitive needs and possibilities for their realization during the performance of game tasks; reasonable combination of emotional and rational during learning;
- 5) conditions that ensure the consistency of the pupils' personal aspirations with the socially useful direction of their activities;
- 6) conditions that provide an appropriate combination of pedagogical guidance and independent activity of pupils, appropriate relation of direct and indirect influences of the teacher and the team on the pupil.

The teacher uses various means of influencing children and plays the appropriate roles in directing the game. Sometimes he becomes a direct participant of the game, and sometimes directs the game, supports the initiative of children, rejoices in their victories.

It is thanks to the rules that didactic games open up great opportunities for education of children's ability to live and act in a team, the ability to subordinate their behavior to certain norms and laws. The need to follow the rules in the conditions of

collective play encourages each child to correlate actions with the activities of other players, promotes the emergence of common interests. Therefore, it is an important condition for the formation of social traits of behavior.

Consider some features of mathematics lesson with a didactic game "Journey to the 7 Wonders of Ukraine".

The lesson is held in the seventh grade while studying the topic "Identical transformations of whole expressions".

Rules of the game: the class is divided into 5 teams-ships depending on the number of pupils. Each team invents its own name and chooses a captain. The game takes place in 8 stages, which have the names of the most famous wonders of Ukraine: Kyiv-Pechersk Lavra, National Historical and Architectural Reserve "Kamyanets", State Historical and Architectural Reserve "Khotyn Fortress", Sofiyivka National Dendrological Park, Sofia Kyivska, Khersones Tavriysky, Khortytsia Island National Reserve.

The results of the stages according to the scheme (Fig. 2) are recorded in the table (Fig. 3).

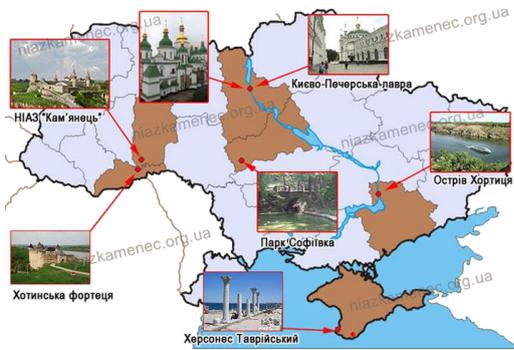


Figure 2. Travel scheme

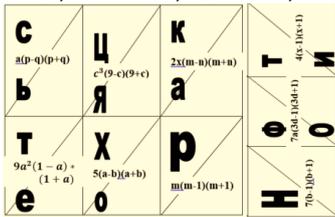
№ Етапи	Команди				
	Команда 1	Команда 2	Команда 3	Команда 4	Команда 5
1. Київ – Печерська лавра					
2. Заповідник "Кам'янець"					
3. Заповідник "Хотинська фортеця"					
4. Національний дендрологічний парк "Софіївка"					
5. Софія Київська					
6. Херсонес Таврійський					
7. Національний заповідник-острів "Хортиця"					

Figure 3. Table of results

At each stage, children receive certain information about a miracle of Ukraine and tasks in mathematics to solve (Table 1).

Table 1

Gradually card for didactic game

Stage	Task	Assessment
I stage. Kyiv-Pechersk Lavra	Decompose the expression to multipliers: a) $3a^2 - 3$; b) $x^3 - 4x$; c) $a^3 - 64$	I place – 3p. II place – 2p. III place – 1p.
II stage. "Kamyanets"	Simplify an expression: 1. $(3m + 5n) + (9m - 7n) - (-2n + 5m)$; 2. $(12ab - b^2) - (5ab + b^2) + (ab + 2b^2)$; 3. $(1.9x - 3)(3 + 1.9x) + 0.39x^2$; 4. $(a + 1)^3 - 4(a + 1)$	The team that copes faster with the expression gets 1b. Representatives from the teams simultaneously perform tasks at the board.
III stage. "Khotyn Fortress"	Decompose the expression to multipliers and guess the encoded words: $5a^2 - 5b^2$; $16x^2 - 4$; $7b^2 - 7$; $ap^2 - aq^2$; $2xm^2 - 2xn^2$; $63ad^2 - 7a$; $m^3 - m$; $9a^2 - 9a^4$; $81c^3 - c^5$; 	The team that copes and guesses faster gets 9 points, the team that copes with the task the last one gets only 5 points.
IV stage. "Sofiyivka"	Solve the equation. $(x^2 + 1)(x^2 - 1)(x^4 + 1) = x^8 + 4x$	1 place – 4p. 2 place – 3p. 3 place – 1p.
V stage. "Sofia Kyivska"	Find the value of the expression and simplify it before: $(ab - 1)(ab + 1)(a^2b^2 + 1)(a^4b^4 + 1)$, If $a = 5, b = -0.2$	1 place – 4p. 2 place – 3p. 3 place – 1p.
VI stage. Khersones Tavriysky	Prove that the expression is divisible by 4: $(n + 1)^2 - (n - 1)^2$	1 place – 5p. 2 place – 4p. 3 place – 2 p.
VII stage. "Khortytsia"	Prove the identity: $c^2(c - 2) - 10c(c - 2) + 25(c - 2) = (c - 2)(c - 5)^2$	1 place – 5 p. 2 place – 4 p. 3 place – 2 p.

The results are summed up and the number of points is counted at the end of the game-trip. The teacher gives grades.

Such a game is the most effective method of teaching in mathematics lessons. During the game, pupils better master the system of concepts on the topic, develop skills of independent thinking, and increase the level of educational and collective work.

The current school course of mathematics has great developing opportunities due to its integrity and logical rigor. Therefore, the didactic game should be in mathematics lessons.

CONCLUSIONS

The highlighted material allows us to draw the following **conclusions**.

1. The using of didactic games in the educational process is one of the ways to intensify the cognitive activity of pupils. Didactic games differ from ordinary ones in that all students are active participants in the game. All structural components of the didactic game are designed in order to interest even those pupils who are not interested in mathematics.

2. Didactic games have a great educational value. They are closely connected with educational work. Didactic game enriches the child's life experience, provides the development of perception, thinking, imagination.

3. In the process of didactic game pupils learn to solve problems, compare, generalize and systematize, make independent conclusions and substantiate them, prove their own opinion.

4. The use of didactic games at different stages of the lesson is a modern and effective means of activating the educational and cognitive activity of pupils. It has a good effect on improving the level of knowledge in mathematics, the development of mental activity.

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ВПРОВАДЖЕННЯ ДИДАКТИЧНИХ ІГОР В ОСВІТНІЙ ПРОЦЕС

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Актуальність впровадження дидактичних ігор у освітній процес полягає у сучасних, ефективних методах стимулювання навчально-пізнавальної активності учнів, озброєння їх новими знаннями, вміннями та навичками, підготовки учнів до самостійного життя. Використання дидактичних ігор при вивченні математики основної школи є одним із методів активізації пізнавальної діяльності учнів під час навчання. Реально на практиці мало хто використовує дидактичні ігри на уроках математики.

Метою статті є обґрунтування поняття дидактична гра та її особливості під час навчання математики.

Методи дослідження: термінологічний аналіз для тлумачення ключових дефініцій дослідження; узагальнення наукових джерел для визначення напрямів розвитку та застосування дидактичних ігор у освітньому процесі.

Результати. У статті обґрунтовано використання дидактичних ігор на уроках математики для ознайомлення учнів з новим матеріалом, для його закріплення, для повторення раніше набутих уявлень і понять, для повнішого і глибшого їх обмісленого засвоєння, формування обчислювальних, графічних умінь та навичок, розвитку основних прийомів мислення, розширення кругозору. Показано, що систематичне використання ігор підвищує ефективність навчання. Найбільші можливості для впровадження ігрових елементів у освітній процес математики дають уроки узагальнення й систематизації знань.

Розглянуто особливості проведення уроку математики в 7 класі під час вивчення теми «Тотожні перетворення цілих виразів» з використанням дидактичної гри.

Зроблені **висновки**, що в процесі дидактичної гри учні вчать розв'язувати задачі, порівнювати, узагальнювати та систематизувати, робити самостійні висновки та обґрунтовувати їх, доводити власну думку. Використання дидактичних ігор на різних етапах уроку є сучасним та ефективним засобом активізації навчально-пізнавальної активності учнів, що гарно впливає на підвищення рівня знань з математики, розвитку розумової діяльності.

Ключові слова: дидактична гра, математика, освітній процес, ігрова діяльність, метод навчання.