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DEVELOPMENT OF SPATIAL IMAGINATION USING DIDACTIC GAMES IN THE PROCESS OF MODERN EDUCATION (DRAWING AS AN EXAMPLE OF THE SCIENCE OF GEOMETRY AND ENGINEERING GRAPHICS).

Annotatsiya. Mazkur maqolada zamonaviy ta'lim jarayonida didaktik o'yinlardan foydalanib fazoviy tasavvurni rivojlantirish bo'yicha metodik tavsiyalar yoritilgan.

Резюме. В статье даны методические рекомендации по развитию пространственного воображения с помощью дидактических игр в современном образовании.

Resume. The article provides guidelines for the development of spatial imagination with the help of didactic games in modern education.

Kalit so'zlari: bilim, ko'nikma, malaka, fazoviy tasavvur, pedagogika, didaktik o'yinlar, qobiliyat, savodxonlik, faollik.

Ключевые слова: знания, навыки, квалификация, пространственное воображение, педагогика, дидактическая игра, способности, грамотность, активности.

Key words: knowledge, skills, qualifications, spatial imagination, pedagogy, didactic play, abilities, literacy, activity.

It is known that teachers who teach drawing geometry and engineering graphics to students use didactic games in order to facilitate their work, increase students' activity in classes and increase their spatial imagination. Because in methodology and pedagogical psychology, great importance is attached to choosing the best methods of educational work, using factors that enhance students' cognitive activity in the educational process. Ensuring the diversity of students' activities in the lesson has become one of the focus tasks of the methodology of teaching drawing geometry and engineering graphics, along with many educational subjects.

The graphic works performed by students are characterized by their knowledge, skills, abilities and imagination, as well as systematized knowledge related to the technique.

It is known from the observations that the students pay less attention to the reading of the drawing, that is, to the development of their spatial imagination, while seriously looking at the graphic field of drawing geometry and engineering graphics. Accordingly, three-fourths of drawing geometry and engineering graphics lessons are spent doing graphic work. Spatial perception is to have a complete understanding of the shape, size, appearance,

situation, and characteristics of the depicted object, drawing, item, detail, etc. Spatial imagination is understood as the human imagination, the ability to visualize the drawing, details, etc.

It is clear from psychological studies that doing the same job over and over again has a negative effect on the human brain and causes fatigue. V.V.Stepakova checked the working abilities of the students in one lesson and found that they remember 9 out of 10 words in the first 10-15 minutes, that is, they master 90%, they cannot acquire new knowledge in the next 5 minutes, and work with old knowledge in the next 20 minutes. He determined to remember 6 out of 10 words in 25 minutes, i.e. 60% mastery. According to the results of this research, didactic games in drawing geometry and engineering graphics can be held for 5-6 minutes after 15-20 minutes of the lesson in order to change the students' work and focus their activity on the subject being taught. These didactic games should serve as a "bridge" in the transition from one topic to another, from one graphic concept to another. A didactic game is a type of educational activity, as a result of which learning, development and education of the student's personality is carried out in an atmosphere of mutual interest and fun.

When creating didactic games, it is necessary to divide each lesson into specific parts, define the concepts and skills that must be mastered, and then plan the game related to the stages of the lesson in advance and follow the general direction of the lesson. should be harmonized. Only then can games have a positive effect on children's graphic literacy.

The game is a type of activity aimed at mastering and creating social experiences and improving one's own behavior. The purpose, function and application of games are different and varied. The game is defined as a type of activity in situations aimed at mastering and recreating social experiences, and in it the control of the individual's behavior is formed and improved. According to D.N.Uznadze, the game is a form of internal psychic (spiritual) behavior characteristic of a person. L.S.Vygotsky describes the game as a means of mastering the inner social world of the child, social orders. A.N.Leontev views the game as a person's freedom to realize his unrealizable interests (interests) in his imagination. American philosopher, psychologist and pedagogue John Dewey founded an experimental school in Chicago in 1885 based on the concept of "teaching through activity", where practical training is the main feature. The main principles of this system are:

- *taking into account the interest of students;*
- *learning through activity (thought and action education);*
- *knowledge and knowledge - as a result of overcoming difficulties;*
- *free creative work and cooperation*

At the same time, the author took into account the ability of the student to master the lessons through his interest, movement, free creative work.

In this regard, professors of graphic sciences E. Roziyev, T. Rikhsiboyev, honorary professor of the university I.Rahmonov, associate professors M.Sh.Isayeva, A.Abdurahmonov, A.Ashirboyev, Z.Mirzaliyev, A.Valiyev and others who have done a lot of research. However, he was one of the first to mention didactic games intended for use in the educational process in the book "Didactic Games from Drawing" authored by Associate Professor I.Rahmonov. This book has not lost its value and is being used in pedagogic educational institutions.

Drawing is the language of technology (technique). The ancient Greeks used the word "techne" to describe the skill and craftsmanship of people, today this concept has become a whole field of human creative activity. To master modern technology, it is necessary to correctly and clearly express thoughts using graphic images, and vice versa, to understand other people's drawings.

One of the ways to acquire such knowledge, skills and abilities is to study the science of "Drawing geometry and engineering graphics". Checking the results of formation of graphic knowledge and skills in this subject is a mandatory component of the educational process. In the science of drawing geometry and engineering graphics, the subject itself requires not only spatial construction, spatial imagination, but also great attention and accuracy of the object or details. In order to improve the performance of the student, to improve his psychological condition, it is recommended to include game minutes in drawing geometry and engineering graphics classes. The game is not only a way to improve the student's psychological condition, but also one of the main ways for them to learn about the world around them.

It is known that in the game, the student enjoys mental activity, learns to observe the discipline of the game, and gets the experience of participating in competitions. This is an important condition for the development of his cognitive interest. Games, despite their ease, simplicity and simplicity, serve as a breeding ground for problematic situations. Active research, assumptions, reasoning, sorting them, making the right decision, etc. lead the student to work with a team, to express his opinion, not to be isolated. The teacher should keep in mind the pedagogical requirements when designing or organizing these games. The game should evoke positive emotions, be competitive, achieve the goal of the game, and take into account the age characteristics of the students. So that the game does not become another test case, it should be accompanied by emotional "intrigue", for example, game propaganda, creative search tasks, etc.

The use of modern forms of educational work is important in increasing the effectiveness of the lesson. Previously, didactic games were used in drawing geometry and engineering graphics classes. But now it is important to find new forms of games that keep the best traditions of the past and keep up with the times. Thus, at present, there are many popular and interesting program-games on TV, the ideas of which can be used in drawing or drawing, as well as in extracurricular activities. For these purposes, not only games, but also elements of computer games can be adapted. Such similes will certainly arouse interest in students.

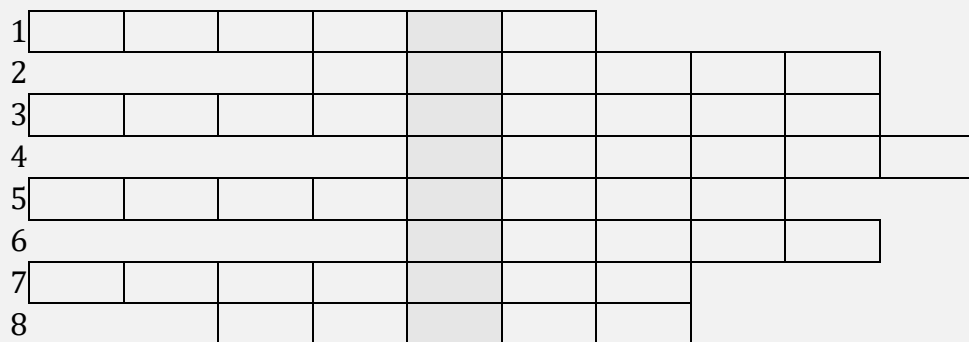
Many didactic games, entertaining tasks and non-standard exercises are aimed at increasing students' cognitive activity during the drawing course. Usually, didactic games take no more than 5 minutes in a lesson and they are held at the beginning to repeat the topic learned or at the end to reinforce new material. But didactic games can be used to activate students' attention in the middle of the lesson. Didactic games are classified according to a number of characteristics:

- *time (game duration);*
- *organizational forms (individual, group, team);*
- *availability of game accessories (cards, geometric objects, playing field, chips, etc.);*
- *field of study (on the basis of which topic tasks were selected);*
- *the nature of the pedagogical process (logical, educational, intellectual, entertaining, etc.).*

The didactic games proposed in this article meet all the listed requirements, including the fact that they are based on the program "Drawing geometry and engineering graphics", they include control games that solve didactic, developmental and educational tasks. Below, we will consider the following didactic games as the most interesting and promising. These are puzzles, drawing scenes, lotto game, auction game, etc.

Puzzles. Solving puzzles is one of the favorite pastimes not only of students, but also of all our compatriots. The use of puzzles in educational activities makes it possible to repeat and strengthen the studied material in an interesting way, develops intelligence, helps to remember the spelling of terms, teaches to work with reference literature.

It is useful for students not only to solve puzzles, but also to take on the task of constructing them independently. In this case, the teacher can use the most interesting science puzzles for further work. Puzzles can be used both in class and in extracurricular activities. Using this method seems interesting and easy, but it creates a lot of complications. What are these complications? - is a natural question. The basis of these complications is that the teaching processes of the current education system seem difficult to students, because different terms and names are found in drawing classes. Some of the students cannot distinguish between the terms and names found in drawing geometry and engineering graphics, that is, they do not understand the terminological words related to this subject found in drawing geometry and engineering graphics classes. In addition to the fact that drawing geometry and engineering graphics are in the system of complex subjects, it requires all-round responsibility from students. The main requirement of this subject is that they should have a good spatial imagination. In addition to teaching students to have a broad imagination, we must also develop the ability to read drawings.

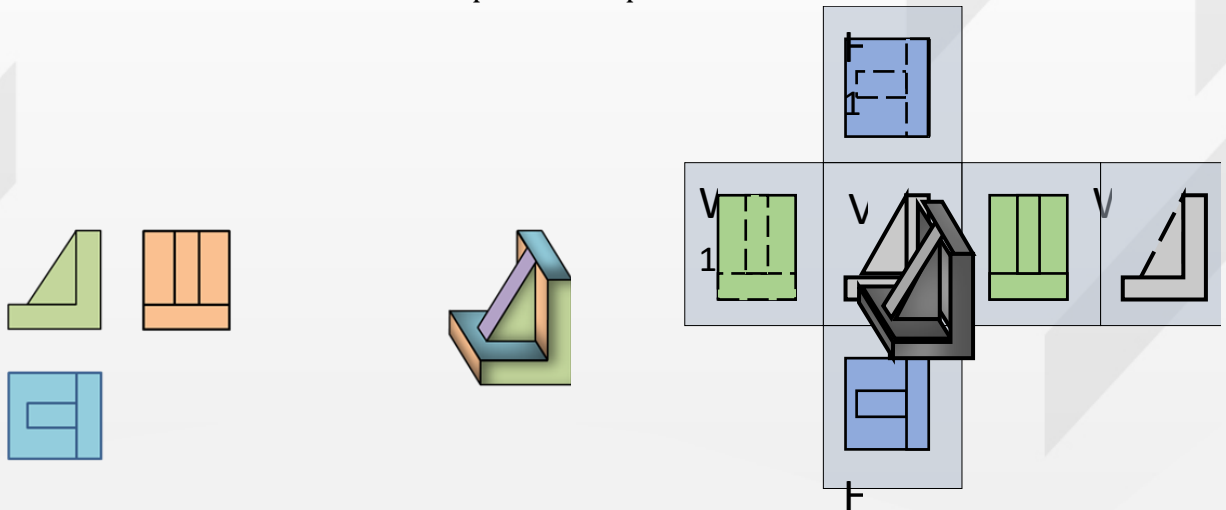


1. What is a straight closed curve that is one of the conic sections called?
2. What is the section connecting the center of a circle or sphere with any point on the circle or sphere?
3. What is the name of the set in which the differences between the distances from the points F_1 and F_2 , which are called the focus, are constant and equal to each other, and which lie in the plane of these foci?
4. What is a set of points located at the same distance from a point (center) on a plane called?
5. What is a second-order straight curve, a set of points equally distant from the point F , called the focus, and the straight line, called the directrix, called?
6. What is an ovoid convex flat closed curve called?
7. Body bounding surfaces.
8. What is a spiral curve formed by connecting arcs of a circle from different centers using a circle?

Draw views. According to observations, during this game, students stop doing a lot of drawing work (according to various estimates, it takes an average of three quarters of the class time), they practice reading the drawing. they continue.

This didactic game can be used, for example, to study the topic "Making three views of the model according to the visual image". In this case, the student is given a clear image of the model, three and six views of the given model are performed according to the conditions

of the game. But at the same time, before implementing this game, it is necessary to provide extensive information within the scope of the topic.

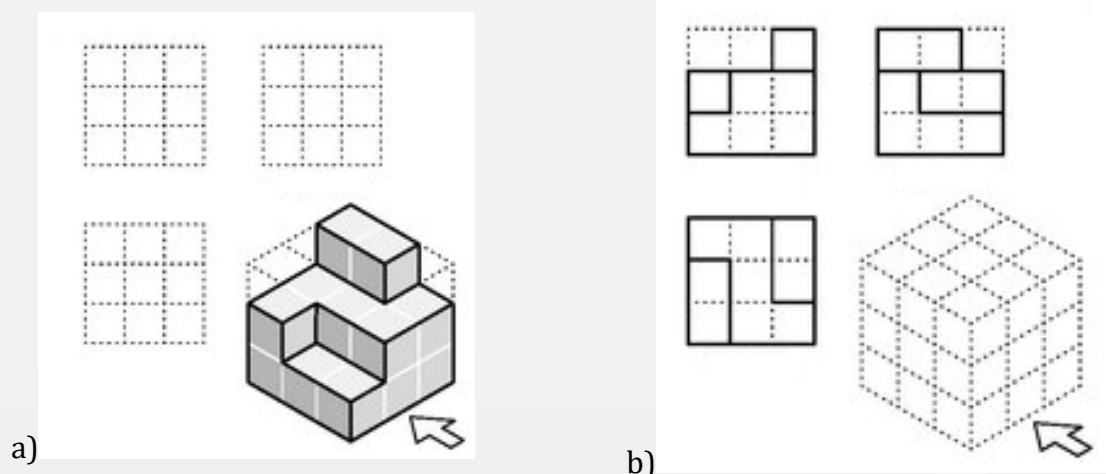


Three views of the model

Six views of the model

At the same time, the axonometric projection of the model is also performed. Such a game can be played in a simplified form. This makes students interested in science and they look forward to drawing lessons. At the same time, good spatial imagination is required from them.

Lotto game. This game is played in the same way as the well-known children's game, in which the views of the assumed models are replaced by drawings of obvious images. In this case, the game participant will make three views of the model based on the clear picture, respectively, in the next step, they will make a clear picture based on the three views of the model. This lotto is convenient for the whole group of students to play, and at the same time, the students are interested in the game. participate with Drawing can be conducted as an extracurricular competition between students or teams of students in geometry and engineering graphics classes. An example of a lotto drawing:



a) Perform three views of the model based on a clear image

b) Perform three views of the model based on its clear image

Auction game. This game speaks for itself. Instead of what is played, the player asks another drawn question, and instead of the amount of money paid for it, the answer is

obtained from the players in the raised hand. Points are awarded for correct answers. If no one gives the correct answer, the question will be removed after 3 blows of the auction hammer. At the end of the game, the student with the most points wins.

Sample questions for the auction:

- *List the necessary drawing tools in drawing classes;*
- *Name the types of graphic images;*
- *Name the types of axonometric projection;*
- *Tell the difference between a sketch and a technical drawing;*
- *What do you mean by making or reading an assembly drawing;*
- *What do you mean by making or reading an assembly drawing;*
- *Define separable and inseparable compounds;*
- *Drawing and other technical issues and creativity.*

Using various games in educational work, it should be remembered that any game, first of all, serves the main task of the lesson (for example, strengthening knowledge) or extracurricular activities (for example, graphic tasks and inspection days) should contribute to the solution. Systematic and purposeful use of didactic games in the educational process increases educational motivation, therefore, the quality of knowledge received by students in drawing geometry and engineering graphics classes, develops spatial imagination based on the nature of the subject. Games make lessons more interesting, teach students to learn vocabulary and specialized literature. Of course, the educational importance of various games should not be exaggerated, because they cannot be a source of systematic knowledge, abilities, skills and should be used together with other educational forms.

Since the game is of great importance in the student's life, not only among secondary school students, but also among students of higher education institutions, the need for the game does not diminish, and therefore in the educational process it is recommended to use age-appropriate didactic games.

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