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Methodology of Effective Teaching of Construction Drawing Using Modern Graphic Programs and Existing Problems

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Annotation: The course of building drawing at the university is aimed at the formation of the graphic culture of students, as well as the creative potential of the personality. Most effective work in this area, especially in teaching construction drawing, is achieved through the use of modern graphics software. Among the graphics programs in the field of architecture in the field of architecture, ArchiCAD is the most advanced, which is an effective way to illustrate the day of a subject by transitioning to a three-dimensional state of drawings in the eyes of students. Therefore, the practical significance of graphic programs and their descriptions occupy a special place in the coverage of the whole essence of this science.

Keywords: Standard, drawing board, student, effective lesson, concept, necessity, drawing, training, sequence, membership, didactic requirement.

The development of spatial imagination depends on a number of factors. These factors include attention, memory, and imagination. While these factors are fundamental, they are also interrelated. It is worth noting that we first mentioned above that if attention is not well developed, the corridor of what to remember in the memory is cut off. If attention is well developed, memory will also work better and will help you remember the information you need. When memory is strong, imagination is also highly developed.

There are the following forms of attention: sensory (perceptual), mental, motor (motor). Cognition is involved in cognitive processes such as cognition, memory, and thinking, and attention helps to increase their effectiveness.

Distraction is the ability to successfully combine two or more different activities (multiple actions) at the same time. A high level of attention is one of the prerequisites for a successful learning process.

Memory is the most important feature of all mental processes and ensures the unity and integrity of a person. The specificity of the activities in which the memory and retrieval processes take place is the basis for distinguishing between different types of memory.

Some types of memory are defined according to three main criteria:

1. moving, emotional, figurative and verbal-logical according to the nature of mental activity;
2. depending on the nature of the purpose of activity - free and compulsory;
3. according to the duration of strengthening and storage of the material - short-term, long-term and operational.

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Here are some aspects of the psychological and pedagogical problems of computerization of the educational process:

- A computer can and should be used to organize educational activities, taking into account the development of personal qualities of students;
- expands the possibilities of providing computer training information;
- Computer allows to eliminate and quickly correct failures in education;
- The computer can be an effective tool for organizing the interaction of teacher and student, students, providing various forms of interaction;
- The computer dramatically enhances the creative process, performs natural and routine operations that almost always occur in all human activities;
- The computer actively engages students in learning activities, that is, controls the actions of students. The set of practical learning tasks using a computer will be expanded;
- computers allow you to use tasks to model and diagnose various situations, as well as expand the range of tasks for planning;
- The computer allows you to change the quality of student control. This technical device allows you to check all the answers, it is possible to determine the nature of the error; helps to determine the level of formation of individual components of educational activities;
- The computer helps students to reflect on their activities, as the computer allows the student to visualize the results of their actions.

People with a rich spatial imagination are quick to accept and analyze information. They are experts in their field. For example, science fiction writers, cartoon and film directors, architects of buildings and structures, designers of mechanisms and machines. The works created by such experts first appear in their imagination in several forms, choose the best of them, and only then present the result to the public.

Detailed imagination is gradually formed and developed in man. First of all, various spatial puzzles and fun tasks, computer games and constructors help. Then, in the process of studying geometry and drawing at school, spatial imagination develops. In higher education, subjects such as descriptive geometry, drawing and design are taught. The nature of education plays a role in the development of spatial imagination. For example, students in architecture prefer pluton views, students in technology prefer volumetric cuts, and students in mathematics prefer isolines and volumetric cuts.

Drawing geometry has the characteristics of science and science, because the main geometric images used in it are abstract elements: a point, a straight line and a surface, that is, the object of abstract imagination.

As MP Titova rightly points out, if a student does not have a well-developed spatial imagination, he will not be able to meet the technical conditions, such as cuts and cuts, to imagine the external and internal shapes of the objects under study. Applying them means that the drawing is complete. Visual and emotional support is needed to correct errors. The action that accompanies the imagination leaves the deepest impression on the memory.

Spatial imagination is a type of mental activity that allows the creation and operation of detailed images in solving practical and theoretical problems. It is a complex process that involves not only logical operations but also many promising actions. That is, to identify the objects to be created and presented on the basis of adequate images, which are objectively represented by real or graphical

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means. Spatial imagination is a type of figurative imagination that retains all its basic features and at the same time differs significantly from it. This is manifested, first of all, in the fact that the spatial imagination works on the basis of images. During this operation, they are changed in the desired direction. The images here are the basic operational unit and the raw material of the imaginary process.

Theoretical data developed by IS Yakimanskaya can be used to determine the structure of spatial imagination:

1. The structure of spatial imagination is determined by the content of the subject and is formed on its basis.
2. An important condition for the formation of spatial imagination is the use of different visual graphic material.
3. The structure of the spatial image depends on the role of the spatial image in solving the problem.
4. Features of the structure of spatial imagination are determined by the nature and content of the subject's activities. The direction and content of this activity will be determined by the methods of the problem developed by the presentation methods (or found in the solution process).

In general, spatial imagination is a basic skill in understanding, comprehending, and comprehending objects in the real world.

Detailed imagination and thinking are used interchangeably in educational psychology, regardless of whether there is a difference between these terms. Spatial imagination is the ability to visualize, which is an innate ability. Imagination is learned or acquired through practice.

J. Eliot and I.M. Smith divide the history of the study of spatial imagination into three separate stages. An additional fourth stage was proposed by S. Strong and R. Smith.

The first stage covers the period from 1901 to 1938 and is characterized by psychologists' attempts to identify a single spatial imagining factor. During this period, research focused on identifying visualization as an important factor in cognition. Because at that time, verbal tasks were considered as the main indicator of cognition. It should be noted that the research and development of the graphic design department of the American Society for Engineering Education (EDGD) focuses on visualization. A historical review of S.L. Miller's research on the development of spatial imagery from 1920 to 1940 (EDGD) is presented.

The second phase, covering the period from 1938 to 1961, focused on the search for several spatial imaging factors, two of which were identified. The first factor is geometric shapes

the second is related to the ability to identify in space, and the second to the ability to mentally control these geometric figures.

In the third stage, from 1961 to 1982, the spatial imagery was further enriched. The effects of age, gender, and experience on individual spatial imagination were studied. Engineering applications were enriched with 2D two-dimensional and 3D three-dimensional spaces, supplemented by graphical presentations and 2D CAD models. Since the 1970s, automated design systems have been created as an effective and inevitable tool.

The fourth stage involves the process of determining the impact of computer technology on spatial perception and measuring this psychological feature of the individual, arising from engineering graphics. 2D and 3D CAD systems have been introduced in the engineering graphics education system and are still in use today.

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The importance of the problem of forming and developing a spatial image is that a lot of research has been done on it. In particular, Uzbek scientists on the development of spatial imagination R.Khorunov, Yu.Kirgizbaev, I.Rakhmonov, R.Ismatullaev, Sh.Murodov, T.Azimov, D.Kuchkarova, E.Ruziev, P.Adilov , S.Saydaliev, Sh.Abdurahmonov, A.Hamrakulov and others, from foreign scientists IPIstomina, OVRazumova, LVZanfirova, LPRusinova, AVPiliper, Yu.A.Volkova, Ye.P.Benenson, NSPodkhodova, AIXubiev, LNAnisimov, XAArustamov, ADBotvinnikov, AVIvanov, I.Ya.Kaplunovich, Yu.F.Katxanov, Ye.I.Korzinov, IIKotov, MNMakarov, AAPavlov, VSStoletnev, VIYakunin, PAOstrojkov, IP These include scientific research by scientists such as Kaloshin.

L.P. Rusinova's work on the use of graphic tasks in the research work, which have a degree of difficulty in the systematic formation of students' spatial imagination, is also of particular interest from the point of view of our research.

Scientific research on the development of spatial imagination of students was conducted on the basis of SS Saydaliev's Eastern architectural traditions, and suggestions, recommendations and methods for the development of spatial imagination were given. The study examined the development of students' spatial imagination through the use of architectural monuments.

Today, the development of the theory of computerization of teaching requires the establishment of general and specific criteria for the creation of educational and electronic developments that really increase the effectiveness of educational activities, form a positive attitude and interest in the subject.

Student activism and independent thinking problems are one of the didactic roots of the practice. If students do not have a spatial understanding of the state of the graphic materials, the teacher's work will not be effective in terms of positive learning outcomes. Modern computer technologies and software based on them effectively help students to think independently and to form spatial imagination in the study of science.

In addition to the use of multimedia e-books in the teaching of "Building Drawing", the use of automated design systems (ALT) software is highly effective. This category of programs can include ArchiCAD, Revit, AutoCAD, 3d Max, Lumion.

To date, the capabilities of ALT graphics software include 3D geometric modeling, parameterization, and 4D modeling, and the use of ALT graphics software in science teaching is highly effective. The ALT ArchiCAD program, which is widely used in educational institutions and design organizations today, has such opportunities. These opportunities help students develop their spatial imagination and independent thinking. The ALT ArchiCAD graphics program can explain many topics in science. For example, it can be widely used in teaching the plan of the building, the facade of the building, the shear of the building, roofing, interior, exterior and other topics.

Today, the combination of new pedagogical technologies, traditional teaching methods and modern computer technologies is the basis for improving the quality of education. There are some problems with using computer graphics in teaching construction drawing:

- Lack of knowledge of science teachers on graphics programs, computer technology and hardware, as well as graphics;
- teachers are not ready to create modern electronic lectures on science topics, which develop students' spatial imagination;

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- Inadequate electronic lectures, textbooks, guidelines are not enough to develop students' spatial imagination;
- Lack of space for the subject of construction drawing and lack of computers and equipment in the lecture halls;
- Lack of methods for effective use of graphic programs in the development of students' spatial imagination in the teaching of construction drawing;
- Lack (in some cases, lack of computers) for the use of graphics programs that reveal the essence of the science of construction drawing;
- Lack of teachers who are well versed in graphics;
- Lack of classrooms for students to work in a graphic program for independent extracurricular activities.

Based on the above considerations, it is necessary to develop manuals, recommendations, multimedia teaching programs for computer modeling of problem problems based on computer modeling, their synthesis, analysis, comparison in order to develop students' spatial imagination.

Using computer graphics in the classroom requires a lot of effort and time from the teacher. Because creating themes in a multimedia form on a computer takes a lot of work. But then it becomes a tool that provides a convenient and easy way for the educator to demonstrate. The advantages of an electronic textbook based on multimedia computer technology are:

- Easy to edit and fill in information;
- does not require financial resources, ie the problem of printing can be solved;
- if the server is hosted on a computer, it can be used by several users at the same time;
- Created multimedia e-textbooks, ease of increasing the number of manuals in demand;
- Convenience in the system of distance education;

The main purpose of the use of computer-assisted learning technology is to develop students' information handling skills, to independently search for and find optimal solutions for the development of their intellectual abilities, to strengthen research activities [41]. This technology does not negate pedagogical technologies, but rather supports them. The combination of pedagogical technologies with modern software and techniques of the computer is expected to be interesting for students.

Students' independent and creative thinking skills can be divided into 3 levels:

- The student looks for ways to solve problems, complete assignments, think independently and think.
- The student completes the assigned task independently, but does not have a creative approach. Solves problems independently, but does not monitor the accuracy of the results. Can fix similar tasks or problems.
- Seeks to use ready-made solutions to the problem. He asks for help when he has a problem. Lacks the ability to solve a problem or task independently.

The purpose of teaching with the help of computer technology is to provide students with a modern view of the knowledge base and the multimedia form in them, to master the topics studied together, to enrich their knowledge, to develop creative and logical thinking skills, to develop spatial

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imagination. The creative approach to their work with the help of the acquired knowledge is to move towards a clear goal and to raise the level of research activities.

Graphics are an important part of developing students' spatial perceptions and related skills. After all, no science can develop spatial imagination and spatial hypothesis like drawing. In order for a student to have a clear idea of the shape of an object from a drawing, he or she must have a clear idea of the geometric objects and their interrelationships. It is especially important for students to have spatial imagination as well as spatial imagination in their graphic preparation.

Based on our existing perceptions, we call the activity of our mind, which consists of creating images of things and events that we have previously perceived. Imagination can be interpreted in different ways, depending on the specific tasks of human practice. For example, in graphic activity, spatial imagination is involved in the process of reflecting the relationships and properties of objects in space. Therefore, the role of spatial imagination in the formation and development of skills specific to different areas of graphic representation is invaluable. It should also be noted that spatial imagination and spatial imagination are involved in graphic activities related to the solution of spatial metric problems.

Experts say that the level of mastery of the material is 10% when reading, 20% when hearing, 50% when seeing and hearing, and 70% when discussing with others. This means that multimedia combines several modes of communication - text, static image (picture, drawing and graphics), dynamic image (animation and video) and sound (digital and MIDI) - as an interactive product.

The use of computer technology in education is especially important as it replaces all visual aids.

New requirements included in the complex psychological and pedagogical requirements of the lecture courses of the multimedia educational system: syncretism of the presentation of educational information, full provision of the system of educational activities, the norm of educational information excess, complementarity of traditional and multimedia technologies, as well as the requirements of the dynamically developing theoretical image of students and their impact on the emotional management of learning activities.

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