METHODS OF FORMATION OF PROFESSIONAL SKILLS OF FUTURE TEACHERS OF DRAWING THROUGH TEACHING SPATIALLY - VISUAL 3D IMAGES

Yadgarov Nodir Jalalovich.
Bukhara State University, professor of the department of fine arts and engineering graphics, PH.D.

Abstract

The professional skills of the future drawing teacher are his integrative quality, characterizing his practical preparation for the implementation of his work with spatial - visual images of a drawing of details, constructions based on the knowledge and competencies acquired. The professional skills of a future drawing teacher are his integrative qualities that characterize his practical preparation for performing his work with spatial - visual images of details, structures based on his knowledge and compensation.

In the process of forming the professional skills of a future drawing teacher in higher educational institutions, their qualitative components, such as spatial-visual 3D images, are interconnected with each other, and engineering graphics are the structural elements of the system. An important role is played by the assessment of indicators of the development of spatial imagination in determining the essence of the concept of “spatial-visual 3D images”. It determines the following indicators of the development of spatial imagination: stability, width, flexibility, depth, completeness, dynamic state of geometric images, expediency, as well as types of work with spatial imagination in solving problems. The totality of these indicators, in our opinion, characterizes the formation of spatial images in students as the most complete and diverse. The research allowed us to identify the spatial-visual 3D figurative competence, which characterizes the level of preparation of teachers for professional activity, as a necessary part of professional skills.

INTRODUCTION.

Research on the mental activity of a person and his character goes back to ancient times. In the work of medieval thinkers who lived and worked in the Middle East, serious attention was paid to the connection of scientific knowledge with the type, principle, structure, criteria of human mental development and maturation1,2.

Al-Khwarizmi clearly distinguished knowing by feeling from knowing by means of “logical reasoning”: he believed that feeling is a “subtle” characteristic, while “logical” studies the

---

essence and that they interact.  

Methods. A large place in the scientific heritage of Beruni is given to the scientific method of studying and knowing nature. In particular, Beruni in the work “Kitob at-ta'khim” gives a definition of a body as follows: «a body, writes Beruni, - is that it is determined by sensation, and it exists in its own way. The boundary of the body is the surface, the edges of the surface are the lines, the end of the line is the point».

In the section of the work on stereometry, the rules for determining the cube, prism, cylinder, cone, sphere, ball fragments, spherical shapes, their surfaces and volumes are given. Also in this chapter there is information about the formation of second-order curves consisting of cone sections, that is, when cutting a cone with planes in different situations, a circle, an ellipse, a hyperbola, a parabola and a straight line are formed in the cross section.

Even today, the development of mental activity in students is one of the pedagogical problems, the optimal solution of which is aimed at increasing the effectiveness of education and upbringing of students. Even today, the development of mental activity in students is one of the pedagogical problems, the optimal solution of which is aimed at increasing the effectiveness of education and upbringing of students.

Drawing uses the achievements of modern didactics, educational psychology in the study of the graphic and mental activity of future teachers in the educational process. In the process of mastering student graphic information, they play an important role in analytical and synthetic activities, as well as thought-provoking operas such as comparison, abstraction, generalization and clarification.

As early as the initial stages of engineering graphics education, the student is shown the ability to abstract. This ability develops when performing graphic actions, the form of abstraction is also improved - from emotional exhibitionism to thoughtfulness, which, in turn, becomes a concept.

In the educational process, abstraction is carried out in two forms: sensory visual means (computer animations, real subjects, pictures, drawings, etc.) and in a word - abstract form (verbal analysis, explanation, definition of the solution of Special Tasks).

The problem of the development of spatial thinking and its components in the educational process many scientists and studied by methodists A.D. Botvinnikov, A.B. Vasilevsky, G.D. Glazer, V.A. Gusev, N.S. Podkhodova, A.Ya. Tsukar, Z.R. Fedoseeva, I.S. Yakimanskaya. In the study of the Methodist scientists mentioned above, the cause of the difficulties encountered in the process of teaching drawing is indicated only by one problem, that is, an insufficiently developed spatial imagination. As a solution to this problem, they propose to provide theoretical information in the form of tasks that require the image of spatial bodies and constructive elements.

The process of forming and developing spatial representations is characterized by the ability to mentally construct spatial images or schematic configurations of the studied objects and perform imaginary operas that must be performed on objects.

---

So, under the spatial representations formed in the process of studying drawing science, we understand the generalized spatial-visual 3D image of a geometric object formed as a result of processing (analysis) of information that came through the imagination about it.

In this regard, we will consider the most used types of visualization, which can be divided into three main groups.

- natural material models (real objects, mechanisms, geometric bodies, etc.), their perspective images (photographs, artistic reproductions can also be included here);
- traditional graphic images (drawings, sections, sections, sketches, etc.) that differ in different shapes and contents.);
- symbolic models (graphs, geographical maps, topographic plans, diagrams, chemical formulas and equations, mathematical symbols).

Mastering the subject of drawing through spatial images in turn leads to the formation of professional skills in the future drawing teacher by activating the ability to work with spatial images.

Spatial images are understood as a holistic figurative representation of a spatial element and objects made up of them.

It is understood as mental activity aimed at working with spatial images, activating elementary images in the right direction, reconstructing them, changing forms, transforming and creating new images on this basis, and the main means of graphic transmission of images is drawing.

Therefore, by knowing the methods of depicting spatial objects on a plane, perceiving spatial images and performing mental actions on them, the necessary conditions are created for creating new images. Modeling in the formation of spatial images serves as a component of spatial thinking. It consists of the following:

1. The process of creating a model combines logical and emotional, abstract and concrete, general and specific, demonstrative and abstractional elements. Logic takes the subject matter from the subject area to the subject area and vice versa, providing information that allows for experimental investigation, measurement, and calculation. The connection between this subject and life is made.

2. Creating a model is the highest form of generalization of theoretical and practical knowledge about geometric shape and methods of its material representation, including precise calculations, construction, integral development, etc.

3. Reflecting on the created model - arouses cognitive interest in the future drawing teacher. The process of cognitive interest is not only thinking about the individual details of the figures and even about the figure itself, but also about the ideas and methods of its creation.

4. A model is a means of verifying the originality of a product of imagination.

5. Development of models synthesizes almost all types of educational activities.

So, by modeling we understand any actions to create realistic and perfect models of objects in the world. The geometric concepts (point, straight line, plane, etc.) are abstract, and in the process of modeling it is possible to see their real image.

In conclusion, we can say that modeling is used as a means of developing figurative (abstract-logical) thinking.
Engineering graphics are studied in three-dimensional Euclidean space, where the subjects of study consist of a set of points. For this reason, 3D technology is used to model the virtual space of spatial images. By transforming objects in this virtual space model, visualization of their spatial-visual 3D images is carried out. The visualization we are referring to is spatial visualization. Spatial visualization promotes the perception of an object by seeing it through the transformation of abstract information and phenomena. In conclusion, it can be said that modeling is used as a means of developing figurative (abstract-logical) thinking.

The creation of spatial-visual 3D images consists of three stages: modeling, visualization, spatial-visual 3D images.

**Visualization** - what is it and how does it work? Visualization is a way of presenting abstract information in a form convenient for visual perception and analysis of a phenomenon. This term is multifaceted, the essence of which is based on the field of activity. The purpose of this method is to successfully assimilate information. Information should come from an abstract phenomenon that requires long reasoning, and as a result of this process, it turns into an invisible one.

**The concept of data visualization.** Visualization helps transformation (transformation) in such a way that it is convenient for visual perception of abstract (abstract) information and phenomena, an object.

This term does not apply to all data visualization methods such as statistics, animation and interactive visualization. In addition to the difference between interactive visualization and animation, Scientific Visualization, applied using special programs, gives a good result. Because visualization of information occupies a special place in education.

This method will be very convenient if the object of research is abstract or invisible objects, for example, molecules. Without special scientific equipment, they cannot be seen through the human eye. Visualization of such objects helps to get used to the essence and create more complex logical chains associated with the object in the future.

**Method of application in science.** Today, visualization is actively used in science, in the process of technological production, in medicine and many other areas of life. In addition to the fact that this method also occupies an important place in the field of computer graphics, it is an integral part of the computer world. Visualization also plays a special role in the development of animation.

Digital animation is used, for example, in the transmission of meteorological information during the broadcast of a weather forecast through a telecram. On TV channels, you can see many examples of visualization from the scientific side, for example, the situation when roads or various equipment were replaced by an animation form.

In the field of education, the demand for animation videos is very high, since in this method it is possible to easily convey all the necessary information to students.

As part of the standardization of publishing, a drawing is considered as an element of the publication: a drawing is a conditional graphic image of an object with an exact ratio of its dimensions obtained by projection, including:
a graph is a drawing that graphically depicts the quantitative ratio and development of interrelated processes or phenomena in the form of a curve, straight line, or polyline constructed in a particular coordinate system;

a nomogram is a drawing that allows you to replace the calculation by formulas with the execution of the simplest geometric constructions, according to which the answers are read using a key;

a plan is a drawing depicting in conventional signs (scale) on a plane a horizontal or vertical projection of the object(s) and its (their) dimensions

**As a means of achieving the goal.** Visualization is also the most important means of achieving a goal. It helps in the same way as affirmations, which aim to improve motivation by visualizing or reflecting mental images. This method began to be used in various fields from the late 70s to the early 80s.

**A tool for creativity.** Visualization is primarily aimed at forming mental images formed from our main goals, stimulating the imagination, and is the most valuable tool for Dream-making creativity

**How does it work?**

Visualization at the level of Physiology shows the effect. Neural connections contribute to the stimulation of the nervous system as real events. Such signals are vibrations of neurons that affect the function of the muscular system, which occurs.

This can be observed in sports games, because in order to achieve a successful result, it is important to clearly understand the rules of the game and adapt in accordance with the upcoming activity. Imagination also needs constant exercise, like any other mental activity.

**When is visualization done?**

Visualization will help you achieve your goals in the process of observing the positive results of work. Most successful people first think, imagine the path of success in their imagination, and only then rush to implement it. It helps to form a specific action plan and is considered an “exercise” of the upcoming event. Any goal, no matter what it is (losing excess weight, improving your career, etc.) needs planning in advance.

**Seeing = believing.** Before reaching the goal, you need to build a way to achieve it with the help of visualization. This method allows you to plan your behavior in the future and achieve the desired result, so this method is very popular among successful people.

**The success of the method.** Studies have shown that when the human brain is photographed during this exercise, important information transmitted through neurons in the brain changes daily life in a way that resembles reality. To create a sequence of actions, the brain creates neural pathways. This process can also be called self-programming.

**Mind and Body: The Connection.** Visualization helps to improve the process of thinking and imagination. It is important to remember that thoughts directly affect reality. It is important to use the resources of the human brain to the maximum to improve the quality of life, to plan your future actions.

In the process of studying the science of drawing, the formation of a spatial-visual 3D image can start from any structural elements and move in any direction. However, according
to the laws of ontogenesis, its development follows the following model: **Real object - image - geometric body** (Fig. 1).

**Spatial –visual 3D shape**

![Diagram of Spatial –visual 3D shape](image)

**Figure 1. The scheme of creating a spatial-visual 3D image of a real object.**

This approach makes it possible to master academic subjects perfectly: - formation of spatial thinking necessary for acquiring knowledge from academic subjects, - visual, convenient and interesting study of academic subjects, - systematization of knowledge about subjects, - increasing the variety and effectiveness of educational methods.

**Discussion.** Based on the analysis, conclusions and opinions described above, the concept of “Spatial - visual 3D image” was defined as follows - it is a real object, abstract information and phenomena transformation in a virtual space model, visual perception of them, obtaining objective information about the object, embodying in them means to understand the information.

The first step in any cognitive process that involves the formation of ideas is perception. For example, observing a drawing, diagram, model, etc. To make it effective, it is necessary not only to look at or observe visual images, but also to understand the information contained in them, that is, to analyze visual information.

The analysis of visual information begins with the creation of a general structure of information placed in a certain visual image (model, picture, diagram, etc.) and highlighting its elements.

Educational materials presented in a visual way are divided into specific elements. For example, when describing spatial or planar geometric configurations, in some cases certain
figures themselves may belong to a structural element (elevations, angles, sides, vertices, etc.)

**Conclusion.**

Working based on spatial-visual 3D images and performing various educational production tasks on this basis is an important feature of human mental activity. Formation of spatial-visual 3D images of students and improvement of related skills is the most important component of graphic activity.

The pedagogical importance of using spatial-visual 3D images in the process of forming the professional skills of future drawing teachers is great, and it consists in educating the most necessary skills and abilities for the production of the present time.

**References:**