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SPATIAL IMAGINATION AND ITS ROLE IN DRAWING AND THE SCIENTIFIC PEDAGOGICAL AND PSYCHOLOGICAL BASIS OF ACHIEVING EFFECTIVENESS IN EDUCATION

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Abstract
This article discusses the concept of spatial imagination, its role in drawing, as well as its scientific, pedagogical and psychological foundations for achieving effectiveness in the educational process.

Keywords: Graphic literacy, visual thinking, technical creativity, projection drawings, modeling, design, creative projects.

Introduction

In the developing world, the power of the state is measured by reforms in the field of education, the intellectual potential of young people, and modern research.

The President of our country Sh.M. Mirziyoyev has introduced clauses defining the effectiveness of pedagogical and psychological concepts in the implementation of the laws covering the rights and interests of the youth of our country, as well as the future years of the education sector. Therefore, education is a systematic process aimed at the formation of deep theoretical knowledge, practical skills and their general and professional knowledge, skills, abilities, and development of abilities.

According to the decision of the Cabinet of Ministers of the Republic of Uzbekistan on the further improvement of psychological and pedagogical support for students, the law of August 14, 2018 PQ-3907 on the effective and high-quality organization of psychological services in educational institutions It is intended to increase the efficiency of the work of guiding students to the profession by applying modern information and communication technologies to work, and also

✓ to help students to choose the right profession based on their abilities, skills, interests and professional inclinations;

✓ to psychologically monitor the personal, mental and social development of students at different ages, to identify psychological defects in education, to prevent any negative deviations that may occur in their mental development;

✓ correction of situations where students cannot adapt to the social environment of the educational institution, organization and implementation of measures for their social rehabilitation;

✓ creation and support of a healthy psychological environment in pedagogical teams, correction of emotional and emotional states of team members, interpersonal relations and conflicting behavior, improvement of their psychological culture;

✓ to identify gifted and talented students, to study their individual-psychological, physiological characteristics and interests, to create conditions for them to demonstrate and develop their abilities;

✓ carrying out activities aimed at preventing the danger of informational and psychological attacks, the negative impact of the Internet global information network, the penetration of "mass culture" that threatens the education of young people;

✓ to help increase the psychological and pedagogical knowledge of pedagogues, students and parents, to ensure effective cooperation of pedagogues, parents and public organizations.[1]

It is known that in the conditions of the development of scientific technology, the requirements for the ability of a person to work with graphic models of various levels of abstraction according to the real characteristics of subjects and objects are increasing day by day. At this point, it is very necessary to increase the graphic literacy of students. That is why psychologists are increasingly interested in the process of visual thinking in the "man and technology" system, and pedagogues and methodologists are increasingly interested in the problem of forming methods and methods of using graphic means of information in the educational process. Because graphic modeling serves as the main means of determining the spatial properties and relationships of objects on the plane. Learning and mastering the technique is inextricably linked with the ability to read drawings. Weakness of drawing skills prevents learning technical sciences. Therefore, it is difficult to imagine the course of physical and chemical processes without drawings when explaining various processes. That's why students start learning the basics of technical knowledge by taking a drawing course.

Spatial imagination is a psychological ability of a person to understand the environment and the shape, size, location and movement characteristics of objects in it. This ability is more important in technical, engineering and drawing activities, it is required in the process of imaging and visualizing objects in space. The development of spatial imagination plays an important role in the teaching of drawing and technical creativity. Spatial imagination is the ability of the human mind to understand the position and shape of objects in space and to recreate them mentally. Individuals with this ability:

✓ they easily determine the shape and proportions of objects in space;

✓ they can imagine three-dimensional (3D) objects from two-dimensional (2D) images;

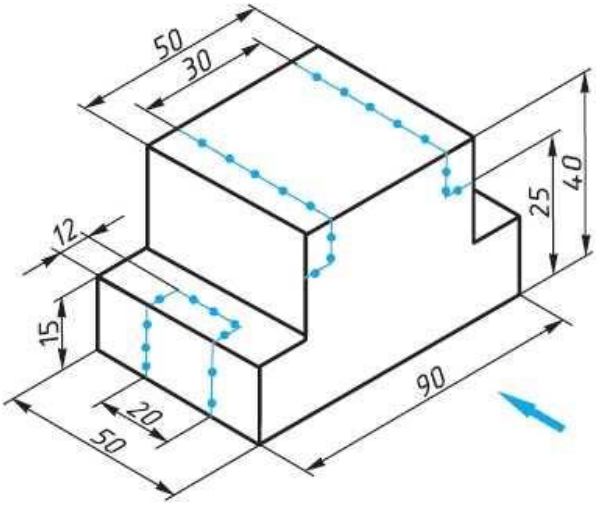
✓ they have the ability to visualize the direction of movement and changes of objects;

1 Appendix 1 to the decision of the Cabinet of Ministers No. 577 of July 12, 2019 (https://lex.uz/docs/-4417140)

Spatial imagination is of great importance in drawing, technical fields, design, architecture and engineering. By developing this ability, students' creativity, logical thinking, and ability to solve technical problems are strengthened. Drawing is one of the subjects that form the basis of technical thinking, and its main goal is to teach students to express their thoughts through drawings and images, to think spatially, and to visualize the shape of objects. Modeling is one of the effective forms of classroom work that develops students' spatial imagination. The didactic advantage of such exercises is that they not only facilitate the formation of an idea about the spatial properties and relations of the depicted object, but also help to better understand all the other information based on the drawing. The essence of this method is that it forms the mental activity characteristic of the process of imagination. In the process of making a model, the practical transformation of images is the basis for the formation of the necessary mental activity. In the process of making a model, the student perceives the shape of the body not only by seeing, but also by the skin sensation, he acquires such activities as making constructions, logical analysis, disassembling the body.

In drawing, spatial perception plays an important role in the following areas:

1. Projection drawings: The student uses spatial imagination to represent three-dimensional objects through two-dimensional images. For example, when creating sections, projections and views.
2. Model creation: Students' visualization of object shapes in space is important in technical design and model creation. (Drawing 1)



Drawing 1

1. Analysis of objects: Spatial vision helps in the analysis of technical drawings, constructions or designs, understanding the relationship between them.
2. Learning mechanical engineering drawings: In technical and engineering fields, spatial perception is of primary importance for reading and understanding drawings.

By developing spatial imagination in drawing, students will be able to solve technical problems and develop their creative abilities.

The following pedagogical and psychological methods can be used in the educational process to develop spatial imagination:

1. Work with drawings:

Exercises for creating various projection drawings, expressing views through drawings.

Exercises to divide three-dimensional objects into two-dimensional projections or, on the contrary, imagine three-dimensional objects based on two-dimensional drawings.

2. Introduction of technologies:

✓ Use of computer graphics and 3D modeling programs (for example, AutoCAD, SolidWorks).

✓ Interactively show spatial objects to students by using virtual and augmented reality technologies.

3. Games and simulations:

✓ Formation of spatial imagination through spatial games (for example, Tetris, Rubik's cubes).

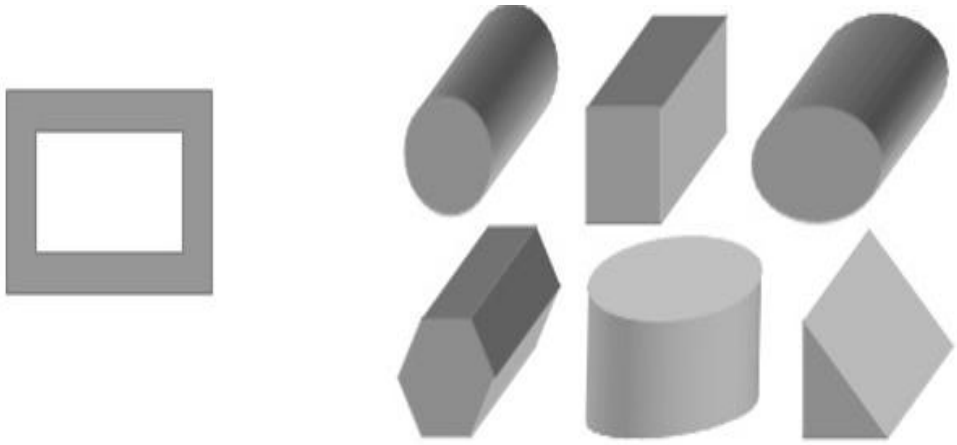
✓ Organization of lessons based on game elements that stimulate technical creativity.

4. Creative projects:

✓ Assign students creative projects related to drawing, for example, creating models or analyzing real objects using drawings.

5. Manipulation of objects:

Modeling geometric shapes and objects, rotating and transforming them in spatial dimensions. (Drawing 2)



Drawing 2

Pedagogical research recommends the following principles for the development of spatial imagination:

✓ Step-by-step development: In teaching spatial imagination, first start with simple shapes and projections, and then move to the stages of complex drawings and modeling.

✓ Practice-based education: Combining theoretical knowledge with practical exercises in drawing.
✓ Individual approach: taking into account each student's mastery of spatial imagination.
The following psychological factors are taken into account in the development of spatial imagination:
1. Time and experience: Spatial perception develops through experience and practice. It is a skill that is constantly formed through practice;
2. Attention and observation: In order to develop spatial imagination, it is necessary to draw students' attention to the details and dimensions of drawings and shapes;
3. Activation of imagination: development of imagination exercises (for example, imagining objects by rotating them in space) in the minds of students;
4. Motivation: To increase students' interest and develop spatial imagination to solve real-life problems related to technical fields;
According to psychologists, schoolchildren need visual aids such as demonstrations, educational posters, models and technical details in the formation of their spatial imagination at the initial stage of education. . In this regard, we will consider the contents of a series of exercises aimed at developing students' ability to analyze the geometric shapes of real objects. Recommended exercises include the following tasks:
✓ to determine important and non-important properties of basic geometric bodies;
✓ analysis of the shape of the main geometric objects (according to models);
✓ analysis of the shape of the part formed by different combinations of the main geometric bodies (on models and machine parts);
✓ restoration of its appearance and clear image according to the description of the item or detail;
✓ writing a description of an item or detail, etc.
After performing such exercises, it becomes much easier to direct students' attention to studying the important and non-important properties of basic geometric bodies.
In conclusion, it should be noted that spatial imagination is of primary importance in drawing, modeling, design and technical sciences, and it forms the ability of students to develop their creativity and solve technical problems. To develop this ability, it is necessary to use modern technologies, practical exercises and creative approaches in the educational process. The development of spatial imagination increases the effectiveness of education and strengthens the logical and technical thinking skills of students. Spatial imagination plays a decisive role in the development of students' logical thinking, creativity, technical skills and ability to solve life problems. It is important not only in the fields of drawing, engineering and technology, but also in mastering natural sciences such as mathematics, physics, and biology. This ability forms students' ability to imagine three-dimensional objects, analyze complex shapes and represent them through two- or three-dimensional images. The development of spatial imagination is an integral part of the educational process in preparing for a technical profession, strengthening creative thinking, and strengthening the skills of logical analysis.
In the modern educational system, the use of drawings, technologies, 3D modeling, creative projects and spatial games is required to form this ability. The importance of the formation of

spatial imagination in education is that this ability not only prepares students for technical and creative fields, but also has a positive effect on their general mental development, logical thinking and self-awareness. Students with spatial imagination have an advantage in solving complex problems, reading technical drawings and implementing new ideas. Therefore, special attention should be paid to the formation of spatial perception during the educational process. It contributes not only to the success of an individual student, but also to the technological and innovative development of society.

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