



ANALYSIS OF THEORETICAL AND PRACTICAL ASPECTS OF EXISTING METHODS IN IMPROVING STUDENTS' SPATIAL IMAGINATION IN DRAWING

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Abstract

This article analyzes various methods and techniques aimed at improving the spatial imagination of students in the field of drawing from a theoretical and practical perspective. Spatial imagination is the process of a person's perception of the environment, imagination and thinking based on it. The development of spatial imagination in the field of drawing is important for students, as it affects their successful work in drawing, sketching, design and architectural design.

Keywords: Imagination, design, imagine, spatial imagination, axonometric projection.

Introduction

The ultimate goal of the socio-political, socio-economic, and ideological changes in independent Uzbekistan is to establish a market-based, legal, and democratic society. The innate enthusiasm, perseverance, inclination towards innovation, creativity, and inherent skill of the youth, coupled with the logical structure of the educational system, undoubtedly play a significant role in the spiritual, economic, and intellectual revitalization and advancement of our people.

Enhancing students' spatial perceptions is crucial in drawing, as it encourages their creative inquiry. According to S.I. Dembinskiy and V.I. Kuzmenko in their textbook "Methods of Teaching Drawing in Secondary Schools," understanding drawing is considered the process of creating a spatial representation of an object in studying its depiction.

Indeed, we interpret design through studying an object's placement, dimensions, and other characteristics, as well as the structural components and symbolic indicators of deviation from the norm. Thus, reading a drawing involves understanding both its internal structures and the external configurations based on



depictions of objects, envisioning the entire depiction, comprehending how it has been reconstructed, and understanding the methods of depiction. This indicates that spatial perception is a fundamental component of reading drawings; consequently, students lacking this skill struggle to interpret drawings and lose motivation to draw. To address students' spatial perception challenges, as drawing teachers, we must direct all our attention, energy, and methodological preparation towards this end.

Only by doing so can we ensure that our youth are well-prepared for future working conditions or educational processes.

The analysis of topics related to scientific research in the primary literature reveals that reading drawings, i.e., visualizing the results depicted in drawings, can be enhanced in the following order:

1. By using the views in the drawing to conceptually break down the object into simple geometric shapes and determine the shape of its external surfaces;
2. By using sections and cuts in drawing to understand and comprehend its internal structures;
3. By analyzing and studying the object's components to reconstruct and visualize a coherent, complete image of it in space;
4. By using the conventional symbols indicated in the drawing, such as (\emptyset), (R), (\square), and (\triangleright), to gain additional insight into certain surfaces and aspects of the object.

The literature on spatial visualization methods predominantly discusses only exercise techniques, which include the following types:

1. Using drawings of simple, intermediate, complex, and highly complex objects to perform their axonometric projections based on a progression from simple to complex, and comparing these with their drawings;
2. Finding projections that match axonometric projections from a projection database and vice versa, i.e., correctly identifying the axonometric projection of an object based on given views;
3. Creating drawings of an object based on its actual or clear appearance;
4. Creating views and clear depictions based on written descriptions;
5. Constructing a third view based on two given views of an object;
6. Drawing the cross-sections of planned elements of objects;
7. Creating models of objects from various materials based on their drawings;



8. Dismantling the assembly drawing of a unit into details.

The spatial visualization tasks mentioned above are intricately connected, requiring students to possess necessary theoretical understanding, practical skills, and competencies.

The methodological analysis of these types of exercises indicates that they align with the "Simple to complex" approach. Consequently, we found it methodologically appropriate to examine in greater detail the distinct forms of spatial visualization exercises in our work. This is because students will perform these types of tasks when they study the scheduled drawing topics in the drawing curriculum.

Using the drawings inserted into objects to conceptually divide them into simple figures and perform their axonometric projection is considered the first method to enhance students' spatial perceptions. Since the drawing and axonometric projection are inseparable, the presence of a neighboring axonometric projection to the views depicted in the drawing facilitates the student's task of embodying the object shown in the drawings. The practices of cutting objects into segments and determining their dimensions and creating axonometric projections further expand students' spatial perceptions.

In observing nature, and studying subjects like art, physics, and mathematics throughout the educational process, students begin to acquire the knowledge, skills, and abilities necessary to thoroughly understand and practically apply the concepts formed in these areas.

Therefore, it becomes necessary to expedite the ability of all students to create drawings of simple geometric objects and to enhance their capacity to visualize spatial images based on these drawings. This capability varies among students. To support this, it is explained that household, environmental, and engineering objects, components, and items consist of prisms, cylinders, pyramids, cones, spheres, and rotational surfaces. By demonstrating their actual forms, and through drawings, students' understanding, skills, and practical competencies can be accelerated. Utilizing visual aids and distributed materials consisting of clear depictions and drawings is a methodologically correct and creative approach. In this context, teaching students to compare the drawing of an object with its actual or clearly depicted version, while also providing written descriptions, symbolic representations, and annotations, is deemed appropriate.



In today's evolving and changing world, there is an increasing demand for highly creative and intellectual workers. For this reason, special attention is being paid to the education sector in our country. "Without new ideas and concepts, there can be no progress or innovation," stated by our President Sh.M. Mirziyoyev, underlining this necessity. Our country is heavily investing in manufacturing, construction, and the creation of advanced technologies. There is a high demand for qualified specialists in these fields. Such specialists need to be highly creative and have broad ideas. Finding such talented youth and guiding them in the right direction is a primary goal of educational institutions. Technical and pedagogical colleges, as well as their teachers and faculty, are putting significant effort into fulfilling this responsible duty. In particular, engineering computer graphics, drawing, geometric drafting, and other subjects are important and beneficial.

The subject of drawing holds a certain advantage over other subjects in enhancing students' spatial visualization and thinking. This field investigates methods of creating two-dimensional representations of three-dimensional geometric shapes on a plane or surface. Furthermore, through the rules in this field, the spatial state and form of a geometric shape can be reconstructed from its two-dimensional depiction on a plane. Here, understanding and comprehending the "transition" from space to plane, and vice versa, from plane to space, requires strong spatial visualization and thinking. Imagination and thought processes are considered cognitive operations in psychology.

"Imagination" is derived from the Arabic word meaning to think, fantasize, visualize, or mentally materialize. As a term in philosophy and psychology, imagination refers to the reflection and embodiment in the mind of a perceived or experienced event or object.

Imagination is the primary building material for fantasy. Essentially, fantasy involves the modification of imagination, including the mental partitioning, combining, transforming, and more of these mental constructs. A crucial role in human activity is played by free imagination—that is, the purpose-directed free play of thoughts.

A student perceives a geometric shape in space and understands it. They also learn to construct its orthogonal projection on a plane. Thus, the student performs the cognitive operations of perception and imagination through their learning activities. During lessons, various visual aids and animations are used, as geometric



shapes such as points, lines, and planes are abstract concepts. As a result, visual perception is developed. In life, one can never physically see or touch a point, line, or plane. These are accepted terms in science, and all details in everyday life and technology, as well as natural objects, are combinations of these geometric constructs.

Points, straight lines, and planes are simple geometric shapes, and various positional and metric problems related to them are presented in educational literature. Even many problems in olympiad geometry are based on these elements. To solve olympiad problems, a student needs to have well-developed creativity. The creativity of a student in the subjects of descriptive geometry and drawing is directly linked to their level of developed imagination and thinking.

Currently, the level of development in imagination and thinking among students being trained as future teachers in the field of drawing is not satisfactory. Students continue to struggle with mentally transitioning from space to flat drawings and vice versa, and with visualizing various geometric constructions in space. To address this issue, pedagogical scholars and draftsmen are conducting scientific research. Our scientific work also presents ideas aimed at solving this problem.

In the field of drawing, there are numerous theoretical and practical methods available to enhance students' spatial visualization skills. Applying these methods collectively plays a crucial role in developing students' skills and raising their professional level.

Additionally, by employing modern pedagogical and psychological methods, students can improve their spatial visualization abilities, which further enhances their creativity and capacity for innovative thinking. This process forms an essential foundation for successful activities in drawing, design, and many other fields.

The integration of such methods not only sharpens technical abilities but also fosters a conducive environment for problem-solving and critical thinking. These competencies are indispensable in today's rapidly evolving professional landscapes, where the ability to adapt and innovate is highly valued. Thus, educational approaches in drawing not only focus on technical skill development but also emphasize the cultivation of a holistic and innovative mindset among students.



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