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Factors In The Formation Of Spatial Imagination Of Schoolchildren In Engineering Graphics Classes

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Annotation: According to many researchers, the lack of spatial thinking skills among students persists from school even until they graduate from university. In addition, the experience of teachers of secondary and higher educational institutions and psychologists, educational researchers shows that students are not able to solve problems based on logical and spatial thinking. All this indicates that in secondary schools, although due attention is not paid to the development of spatial thinking, more educational work is carried out aimed at expanding verbal and logical thinking.
Keyword: developed, development, technical, theoretical, problems, technical, description, education

Introduction The creation of a bright future for the country, the dissemination of its name in the world, showing society the national and cultural heritage created by great ancestors, its enrichment, and ensuring that our independent republic takes its place among developed countries depends on the education of the younger generation. as a wonderful person and qualified specialist.

The development of high-level spatial thinking is one of the most important factors in mastering general education subjects and special technical subjects. The breadth of spatial thinking is also necessary when preparing for practical activities in many specialties.

According to many researchers, the lack of spatial thinking skills among students persists from school even until they graduate from university. In addition, the experience of teachers of secondary and higher educational institutions and psychologists, educational researchers shows that students are not able to solve problems based on logical and spatial thinking. All this indicates that in secondary schools, although due attention is not paid to the development of spatial thinking, more educational work is carried out aimed at expanding verbal and logical thinking. Of course, this is good, but we believe that taking both together will help increase the child's intelligence even more.

At present, we can say that the process of development of spatial thinking has not been fully studied. The conditions for its full formation in school-age children have not been sufficiently studied. Based on the nature of educational activities, there have not yet been enough studies comparing the level of development of spatial thinking at different age levels. Spatial thinking is a manifestation of mental activity, a factor that ensures the creation of spatial images and work with them when solving practical and theoretical problems. In this complex process, not only logical (explainable in words) practices are built on the basis of thinking, but also further actions; it is easy to recognize an object and change its shape, in contrast to the verbal method.

The achievement of thinking in this system of images shows the uniqueness of spatial thinking. In spatial thinking, the main features of figurative thinking are invisible. In particular, the choice of a spatial number system is important in the process of solving problems (practical, professional,

graphic) when creating spatial images and relying on them.

We can say that spatial thinking is the main component in solving practical problems related to the world of objects and natural phenomena, and it is formed earlier than figurative thinking.

Spatial thinking among students, problems of forming spatial imagination, are a product of the above processes and are designed to cultivate spatial vision, without them it is impossible to master the science of engineering graphics.

The development of imagination is one of the important conditions for acquiring the ability to read and draw. At the same time, the process of learning to draw is the most important tool for developing imagination. Here, in our opinion, it is appropriate to recall the opinion of mature specialists who said that "Drawing is the most convenient tool for conveying creative ideas."

Based on long-term theoretical and experimental research, the following criteria are used to determine whether students have developed spatial imagination, perfectionism, understanding of reality and scientific skills:

1. Understand this object among the objects of existing reality.
2. Recognize the object among the images.
3. Establish a connection between words, imagination, images and objects in existing reality.
4. Visualization of the object in the imagination (memory-imagination).
5. Imagination in memory (words, graphs, models).
6. Creation of new objects in the imagination (imagination).
7. Realization of imagination (words, graphics, models).

Based on these skills, it is possible to determine the level of development of students' spatial imagination.

Level I (Collection). Collection and study of spatial signs and proportions. Students collect various spatial concepts, learn to understand the special signs and proportions of spatial objects of various shapes. They are able to name an object, find objects in existing reality from a picture (skills 1-4).

Level II (description of what is remembered). Realization of imagination in memory. Students develop the ability to describe spatial signs and proportions known to them (in the imagination, through words, in pictures, in the form of models). They significantly expand the stock of spatial terms. The word now has a signal meaning, creating a sense of relevance in students (Skills 1–5).

Level III (Constructive). Independent construction and design of a spatial image. Students create new concepts based on formed spatial representations, describing them in words, using numbers and pictures (skills 1-5, partially skills 6.7).

Level IV (Intellectual). A mental approach to spatial perception. Students will have a rich stock of spatial imagination and terms, they will be able to easily differentiate in their understanding of spatial signs and proportions. Once they reach this level, they have the ability to imagine the movement of a spatial object (symmetry, translation, rotation) and can determine their position after movement in a picture (skills 1-7).

The main goal of the Engineering Graphics course is to teach students graphic literacy. After mastering this course, students in grades VIII - IX should be able to create complex drawings (sketches) from simple parts, clear images, understand and read simple architectural and construction drawings, kinematic and electrical diagrams of simple objects.

Important objectives of the course are to develop the student's imaginative thinking and familiarize himself with design processes carried out using graphic tools.

"Engineering", considered a general education subject, is undergoing changes due to social trends. Teaching graphic literacy to schoolchildren from an information and cultural point of view is being improved, updated and revised.

Thus, the goal of engineering education remains the cultivation of graphic culture:
learning a graphic language - communication, transmission and storage of information about objects is carried out using various techniques and methods of depicting them on a plane;
mastering the rules and methods of making and reading drawings for various purposes;
development of logical and spatial thinking, static, dynamic spatial imagination;
develop creative thinking and the formation of basic skills in reorganizing the shapes of things, skills in changing their position and location in space.

Conclusions The above views are interrelated and complementary factors that reveal modern ideas of preparing schoolchildren for visual literacy.

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