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THE METHOD OF FORMATION OF GRAPHIC LITERACY OF STUDENTS IN THE PROCESS OF LEARNING TO DRAW

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Annotation: The article presents methodological recommendations on theoretical issues of development of skills of drawing and reading geometric shapes in students in the process of learning to draw, direction and manifestation of problems of use of ICT in the formation of graphic literacy of students in drawing, as well as simple design questions related to the development of spatial imagination through spatial thinking. It is also considered the development of spatial imagination in the process of forming students' graphic literacy in drawing and directing them to creative thinking.

Keywords: drawing, design, graphic literacy, geometric body, construction, model, imagination, creative search, PowerPoint, AutoCAD.

In the context of modern educational reforms, the importance of developing students' intellectual potential and creative thinking is steadily increasing. In engineering and architectural education, the ability to understand and create technical drawings is considered a fundamental competence. Graphic literacy — the ability to read, interpret, and create graphical representations — plays a vital role in forming students' spatial imagination and design thinking. The process of teaching drawing in higher education institutions must therefore aim not only to develop practical drawing skills but also to enhance students' analytical, constructive, and visual-perceptual abilities. Graphic literacy is the foundation of technical communication and design visualization. According to contemporary pedagogical theory, graphic literacy is not limited to drawing ability alone; it encompasses understanding the geometric structure of objects, spatial reasoning, and the capability to interpret graphical symbols and standards. In the teaching of descriptive geometry and technical drawing (drafting), this literacy is formed through systematic exposure to different projection methods, 3D modeling, section views, and dimensioning standards.

Prominent scholars emphasize the role of active learning, visual aids, and computer-aided design (CAD) tools such as **AutoCAD** and **SolidWorks** in enhancing students' graphic literacy. Integrating these digital tools with traditional teaching methods increases students' motivation and facilitates a deeper understanding of technical visualization.

Task 1: Visual Matching Exercise Based on Self-Assessment Method

(Graphic Task for Revising Learned Material)

Objective:

To reinforce previously studied material through a visual matching activity using the "Self-assessment" method.

Instructions:

Students are given a set of **mixed views** of various mechanical parts, including:

- **Front view**
- **Top (horizontal) view**
- **Side (profile) view**

These views are randomly presented. Students must correctly identify and match the related views of each part by **placing them into the appropriate cells of the table** (Table 1). Each correct answer is rewarded with a point.

Table 1 – Matching Different Views of Mechanical Details

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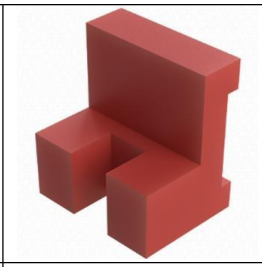
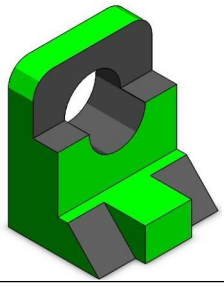
1					
2					

Graphic Task 2: Designing Complete Technical Drawings Based on Incomplete Models

In this graphic assignment, students are provided with a technical drawing of an object that contains missing lines or incomplete views. Based on the given information, students are expected to:

- Analyze the existing drawing
- Identify the missing elements
- Propose and design multiple solution variants
- Complete the technical drawing according to engineering standards

Skills required from students:

- Technical drawing literacy
- Ability to read and interpret projections
- Well-developed spatial imagination
- Creative thinking and solution modeling
- Capability to visually reconstruct and finalize a drawing in graphic form

Objective: This task aims to develop students' analytical and constructive thinking, improve their spatial visualization skills, and promote independent creative problem-solving through technical design.

The analysis of the applied teaching methods reveals that the development of graphic literacy among students is most effective when traditional technical drawing instruction is integrated with digital tools such as AutoCAD and PowerPoint. The use of incomplete drawings (e.g., missing lines or partial views) as learning materials encourages students to actively engage with the content and develop creative, analytical, and spatial thinking skills.

In Graphic Task 2, where students are asked to reconstruct a complete technical drawing from an incomplete model, learners demonstrate a higher level of cognitive engagement. This task requires them not only to recall theoretical knowledge but also to apply it in practical situations through graphical reasoning. Many students approached the problem from different perspectives, suggesting multiple solutions, which indicates an improvement in divergent thinking and problem-solving abilities.

Moreover, students showed increased confidence in interpreting projections and visualizing three-dimensional objects from two-dimensional views. The use of self-assessment tasks and visual prompts further contributed to reinforcing learning outcomes and allowed students to independently evaluate their progress.

The observations also suggest that integrating visual learning strategies improves students' long-term retention and interest in the subject. The interactive nature of tasks, particularly those

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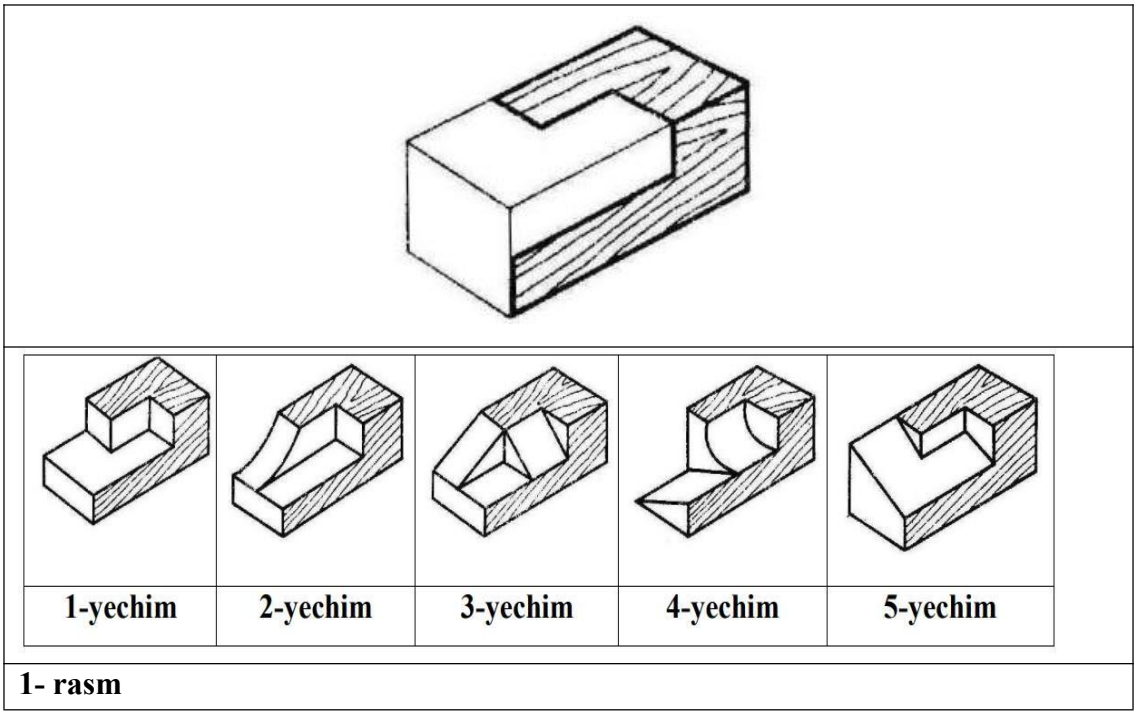
involving 3D modeling or completion of technical views, helps transform the drawing process into a dynamic and explorative activity, rather than a mechanical one.

Thus, the findings support the hypothesis that combining traditional and modern approaches in teaching drawing enhances graphic literacy and stimulates the intellectual and creative development of future technical professionals.

Figure 1: A sample of an incomplete technical drawing (to be analyzed and completed by the student). *(Let me know if you need this figure as an actual image — I can create or provide it.)*



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In conclusion, the formation of graphic literacy is a vital component of technical education, particularly in fields related to engineering, architecture, and design. Teaching methods that combine classical drawing techniques with digital tools such as AutoCAD and PowerPoint have proven to be highly effective in enhancing students' spatial imagination, technical reasoning, and creative thinking.

Through practical tasks like completing incomplete drawings, constructing 3D models from 2D projections, and engaging in self-assessment exercises, students develop a deeper understanding of the principles of technical drawing and gain confidence in applying them to real-world problems.

The integration of interactive, visual, and problem-solving strategies not only improves students' academic performance but also prepares them for the demands of modern industry, where digital competence and graphical communication are essential.

It is therefore recommended that technical drawing instructors adopt a blended methodology that balances manual drafting skills with digital technologies to effectively nurture the next generation of creative and competent professionals.

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