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THE METHODOLOGY OF DEVELOPING MOTION DESIGN SKILLS IN STUDENTS: A CASE STUDY OF ENGINEERING

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Annotation:
The methodology of developing design skills in students is an important component of the modern educational process, where an organic integration of art and technology is established. This process not only teaches students creative thinking but also guides them toward creating practical projects. This article highlights the methodology for developing motion design skills in students through the example of the Engineering Graphics course. The study analyzes the possibilities of enhancing students' visual thinking, forming design culture, and improving design competencies by applying animation and digital technologies in engineering graphics.

Keywords: motion design, engineering graphics, graphic thinking, digital technologies, visual communication, animation, design education.

In the era of digital technologies, interactive, visual, and multimedia approaches are becoming increasingly important in teaching traditional disciplines. Engineering graphics is one of the key subjects that develop students' graphic thinking, spatial imagination, and technical creativity, and therefore, it is necessary to enrich its teaching with modern instructional methods.

In recent years, the integration of motion design elements into the educational process has significantly increased the effectiveness of teaching engineering graphics. Animated visualizations help students better understand drawings, mechanisms, spatial shapes, and their mutual motion. Thus, developing a

methodology for forming motion design skills based on engineering graphics contributes to the creation of an innovative approach in education.

Engineering graphics develops students' visual thinking, technical logic, and design abilities. However, this process is often limited to static drawings. Motion design, in contrast, adds elements of movement, time, and dynamics to these drawings.

Through this approach:

- the operating principles of complex forms and mechanisms can be explained through animation;
- students' spatial perception and graphic thinking are further developed;
- learning materials become more visual, engaging, and memorable.

For example, topics such as projection, sections and cut shapes, and assembly of parts can be demonstrated through animation using tools like *After Effects*, *Blender*, or *AutoCAD Animation*, which helps students grasp the material more quickly and effectively

Pedagogical Stages of Teaching Motion Design in Engineering Graphics

1.The process of teaching motion design within the framework of engineering graphics can be implemented through the following pedagogical stages:

2.Preparatory stage: Students are introduced to the essence of motion design and its application in engineering.

3.Practical stage: Students learn to create 2D and 3D models, animate them, and demonstrate motion and projection processes.

4.Integrative stage: Based on an engineering project, a motion graphic (for example, an assembly animation of a part) is developed.

Presentation stage: Students present their works and visually explain technical processes.

The Pedagogical Importance of Motion Design.The specificity of the design field requires students to acquire skills such as design planning, sketching, color selection, composition, and working with graphic and interactive tools. Moreover, they must learn to use modern technologies and software products. Mastering digital design, 3D modeling, and virtual and augmented reality platforms forms a wide range of skills that make students competitive in the modern design industry.

Developing design skills in students requires teachers to have a high level of pedagogical qualification and methodological preparation. Teachers must continuously improve their knowledge, master modern methods and technologies, and apply innovative approaches to ensure the effectiveness of the learning process. In addition, establishing effective communication and motivation systems for students is of great importance.

Developing creative thinking among students is one of the most urgent issues in modern education. In today's rapidly changing environment, success requires not only knowledge and skills but also the ability to think creatively and generate new ideas. Creative thinking is the ability to find unique solutions to problems, discover new opportunities, and go beyond conventional boundaries.

Therefore, educational institutions must guide students toward creativity and teach them new ways of thinking. One of the most effective methods for developing creative thinking is problem-based learning, in which students are presented with complex and ambiguous problems with no clear solution.

Project-based learning is another effective approach that fosters creativity. Students work on topics of personal interest and practical significance. Through such projects, they apply theoretical knowledge in practice, conduct independent research, and develop teamwork skills. During the project process, students learn to solve problems using innovative solutions — a key indicator of creative thinking.

To achieve more effective results, the brainstorming (idea marathon) method is widely used. In this method, a group of people freely presents different ideas related to a project or problem. The temporary suspension of criticism and evaluation encourages the emergence of new, unconventional ideas. Students freely exchange thoughts, which increases creative approaches. This method helps young people express their opinions and develop new perspectives.

Role-playing and simulation methods also play an important role in enhancing creative thinking. Playing different roles in unusual situations improves students' empathy and ability to view problems from multiple perspectives. These methods teach students to analyze complex situations practically and respond quickly and creatively.

To effectively develop design competencies, lesson topics and content must correspond to students' levels. The curriculum should be carefully planned and organized to connect theoretical knowledge with practical skills. This approach enables students to apply what they have learned in practice and experiment with new materials.

The integration of innovative methods such as computer-aided design (CAD) programs, 3D modeling, and interactive simulation tools into the teaching of engineering and computer graphics can effectively solve this problem. This approach makes the learning process more engaging and practical, allowing students to apply theoretical knowledge in real-life situations. Additionally, the use of project-based learning and collaborative tasks helps students develop essential skills such as critical thinking, problem-solving, and teamwork, which are vital for modern engineers.

In some countries, such as Japan, interactive simulations and virtual laboratories are used in teaching engineering graphics and design. These technologies allow students to model various issues that arise during the design process—such as material properties, mechanical forces, and other factors—and test their projects virtually.

In Uzbekistan and other Central Asian countries, the teaching of engineering graphics has its own characteristics. Although traditional methods are often focused on technical drawing, in recent years modern technologies and methodologies have been introduced.

Teaching motion design within the framework of engineering graphics leads to the following outcomes:

- the development of spatial imagination and technical creativity in students;
- strengthening of graphic thinking and visual communication skills;
- formation of design thinking, animation analysis, and technical visualization abilities;
- a more visual, engaging, and innovative learning process.

This approach not only increases educational efficiency but also enhances students' interest in the field of motion design.

An analysis of the current state of methods for developing design skills shows that the importance of effective pedagogical approaches and methodological tools is

growing. In design education, principles such as fostering creative thinking, strengthening practical skills, and encouraging independent learning are of high priority. Modern methodologies emphasize project-based learning, interactive teaching methods, and technological integration, which create new opportunities for preparing students for the professional environment.

As a result, this process becomes an essential factor in improving students' professional training and contributes to their development as highly qualified designers. The use of motion design elements in teaching engineering graphics not only develops students' technical thinking but also nurtures creativity. Through motion graphics, static drawings are transformed into dynamic and interactive educational tools.

Thus, the methodology for developing motion design skills based on engineering graphics serves as an innovative and highly effective approach in modern education.

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