

## METHODOLOGY FOR USING 3D TECHNOLOGIES IN THE FORMATION OF CONSTRUCTIVE COMPETENCES OF STUDENTS

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**Abstract.** *The article describes the factors of improving the didactic support and the use of interactive methods and tools for the method of developing students' constructive competences using 3D technologies in the teaching of drawing geometry and drawing. In addition, computer graphics programs, knowledge control systems, graphic design assignments, and multimedia training sessions were used as modern didactic tools for developing students' constructive competencies based on information and communication technologies.*

**Keywords:** *3D technology, information communication technologies, drawing geometry, drawing, engineering graphics, preparation for research activity, constructive competencies, levels of creativity, innovative activity, interactive methods.*

**INTRODUCTION.** The student should have the competence to use 3D technologies. For this, it is necessary to acquire skills in the field of information technologies: to solve the problems of data processing of users using modern information and communication technologies [8]; It is determined by the development of the skills of using modern information and information and communication technologies for the problems of professional activity and organization of one's work [9].

Gaining the competence of creative thinking with the help of 3D technology. It should be noted that for the reliability of obtaining the results of scientific research, we do not consider individual competencies, but the competence of the student, because this concept is much broader, it includes not only the components of knowledge and activity, but also motivational characteristics. It should be noted that, according to some pedagogic scientists, by competence we mean personal qualities, which means having certain competencies. Thus, in the study of competence, a person's overall characteristics (abilities, motivations, knowledge, skills, abilities) that ensure the successful performance of a person's future professional activities are considered. In accordance with the standard of higher education, a student in the field of technical higher education institutions should acquire general cultural and constructive competencies. Taking this into account, we should mention that the technique of developing students' constructive competencies is one of the urgent issues facing higher education institutions.

**LITERATURE ANALYSIS AND METHODS.** I. Rahmonov is a leader in writing appropriate methodical works for teaching drawing geometry and drawing. In 1996, the book "Didactic games from drawing" was published. This book includes scientific and methodological recommendations on how to organize a lesson with the help of game technology. In addition, under the leadership of I. Rahmonov, the textbook "Drawing" was prepared and published for students of higher education institutions [10].

I.Rahmonov [11] and A. Valiyev [11], in co-authorship, highlighted the role of modern pedagogical technologies in teaching engineering graphics.

Professor E. Roziyev [13] and associate professor A. Ashirboyev [13] co-authored the first textbook on methodology in Uzbek language.

The textbooks written by I. Rahmonov for students of general secondary schools are of great service to our young people's mastery of graphic education.

The textbook of associate professor A. Ashirboyev [31], teaching manuals of professors E. Roziyev [14] and R. Latipov [14] are used for vocational colleges.

S.R. Markoulis offers students the following components of competence to perform professional graphic work on the basis of a modular-competency approach:

- 1) cognitive;
- 2) value-based;
- 3) technical and technological;
- 4) communicative;
- 5) reflexive.

S. Sakovich [6] defined the following components of the development of creative activity of students by teaching the following auxiliary projection methods:

- 1) cognitive component reflecting the system of knowledge obtained from the field of professional graphic activity;
- 2) activity-creative component reflecting the formation of skills using professional graphic activity;
- 3) axiological component that reflects the level of formation of value directions of the student's personality;
- 4) a personal component that reflects the student's readiness to acquire research competence.

E.V. Shalashov revealed the structure of forming students' creative activity:

- 1) motivational;
- 2) cognitive;
- 3) operational and activity;
- 4) value-semantic.

Extensive work is being done to accelerate the introduction of information and communication technologies in the world education system. The process of informatization of education, without a doubt, is integrally dependent on the competence of teachers who provide education and training to young people who provide the future of our country with the use of information and communication technologies in the course of their professional activities [5].

**RESULTS.** Based on the above considerations, it can be said that the psychological-pedagogical and didactic possibilities, methodology, scientific foundations of creating and using modern didactic tools for training students of technical higher education institutions have not been fully revealed, the problem of their improvement not specifically researched [4].


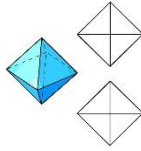
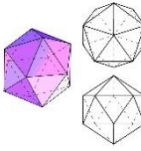
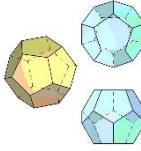
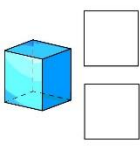


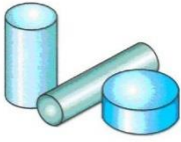

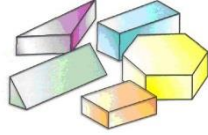
The Insights method (Insayts) metodi

This method can be used both individually and with friends or a team, supporting each other at the same time.

With this method, you will improve your creative and constructive problem-solving skills by looking at the picture.

As we get older, our brains develop the ability to connect different facts and see new ideas and challenge old beliefs with new knowledge. We can't memorize and learn new things as quickly as children, but as we gain more experience, we have a wider spectrum of information to draw upon. This method will help you practice your ability to generate insights and generate new ideas. You get one point per insight per day. You must have at least one new insight, that is, one new idea per day, otherwise it's game over and you have to start over with 0 points. You get extra points for insights that change your preconceived notions about a topic.

The goal of this game is for you to get better at solving more complex problems by looking at your own drawing.

				
<b>Tetraedr</b>	<b>Oktaedr</b>	<b>Ikosaedr</b>	<b>Dodekaedr</b>	<b>Kub (Geksaedr)</b>
				
<b>Kesik oktaedr</b>	<b>Piramida</b>	<b>Silindr</b>	<b>Konus</b>	<b>Prizma</b>

Steps to follow while using the method:

Write down new thoughts and ideas, think about what they mean and how to use them.

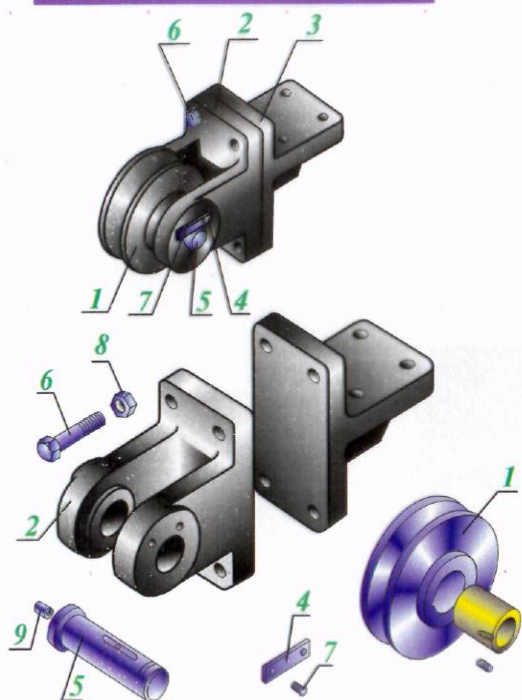
Say your daily insight out loud to celebrate your victory in the Insights method!

**DISCUSSION.** The student's constructive competence develops to a certain extent during independent education. In this case, it is recommended that the student, while solving constructive work, use computer graphics to analyze problems that are unfamiliar to him, as well as issues that require obtaining new information about them. During such independent work, the student should describe the details with the help of computer graphics, imagine assembly drawings, quickly imagine graphic work with the help of a computer, analyze the results of graphic work and implement them. The organization of activities aimed at mastering the method of performing graphic work in a given situation allows the engineer's knowledge to increase.

The development of the above organizational and pedagogical conditions ensures the development of constructive competences of bachelors of engineering education.

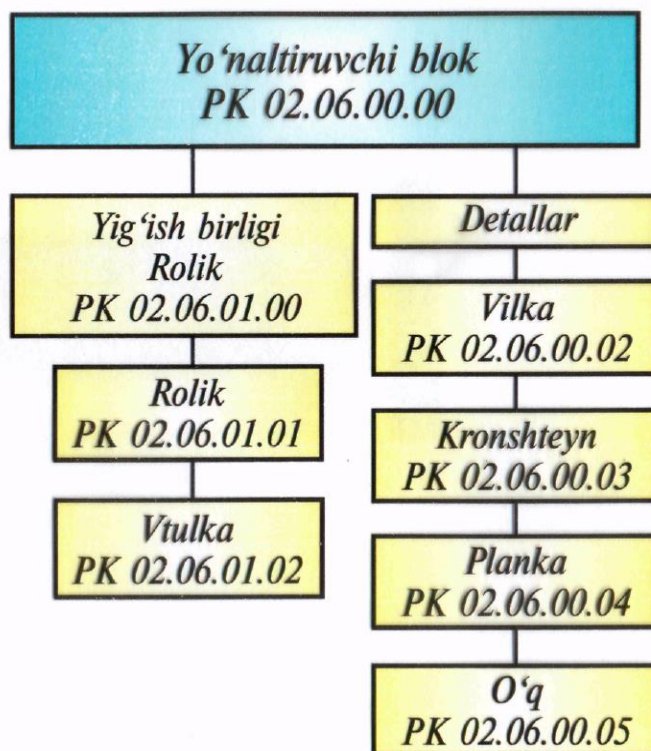
**CONCLUSION.** In conclusion, it is possible to say that by engaging students in graphic work, the efficiency of using information technologies has been increased by performing various computational graphic works on "Engineering and computer graphics". Constructive competencies of students are developed by summarizing, analyzing, and drawing conclusions from the data obtained while performing graphic work. In addition, the "Total Physical Response" method was used to develop students' constructive competences (names of polyhedron shapes are written on cards) and a study guide was created and applied to the educational process.

**1. Buyum bilan tanishish**



- |               |                 |
|---------------|-----------------|
| 1- g'ildirak  | 6- bolt         |
| 2- vilka      | 7- vint         |
| 3- kronshteyn | 8- gayka        |
| 4- planka     | 9- press-maydon |
| 5- o'q        |                 |

**2. Buyumning tashkiliy bo'laklarini spetsifikatsiya bo'yicha taqsimlanishi va ularning nomlanishi**



**1. Getting acquainted with the object. 2. Distribution of organizational parts of the product according to the specification and their naming.**

**1-Wheel, 2-Fork, 3-Bracket, 4-Plank, 5-Bullet, 6-Bolt, 7-Screw, 8-Nut, 9-Press area**

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