

## **TECHNOLOGY OF TEACHING THE TOPIC OF PROJECTIONS DEFINED BY NUMERALS**

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**Annotation:** This article explores modern pedagogical technologies for effectively teaching the topic of projections defined by numerals in engineering graphics and descriptive geometry. The study emphasizes interactive methods, digital visualization tools, and step-by-step instructional strategies to enhance students' spatial imagination and mathematical thinking. The integration of numerically defined projections into the curriculum not only strengthens technical drawing skills but also improves learners' ability to interpret complex spatial relationships. The paper also analyzes challenges faced by students and proposes solutions for better comprehension and engagement.

**Keywords:** projections, numerals, teaching technology, engineering graphics, descriptive geometry, spatial thinking, technical drawing, interactive learning

The concept of projection is one of the main sections of engineering graphics and drawing geometry, which studies the principles of constructing images of objects projected onto a plane. The concept of projections defined by numbers is based on the method of expressing and determining projection images through numerical coordinates. This approach is widely used in the fields of drawing geometry, engineering graphics and 3D modeling. Projections defined by numbers are images of geometric objects projected onto a plane, which are clearly defined through numerical coordinates. In this approach, each point or drawing element (lines, planes, points) is expressed using precise mathematical formulas and numbers. Numerical projections have the following basic principles: each geometric object is defined by coordinates, dimensions and shapes are expressed with precise mathematical accuracy, and allow for automated image creation in graphics and computer systems. This projection method is especially widely used in engineering graphics, computer graphics, and drafting geometry.

Numerical projections are fundamentally different from traditional projection methods. In this case, the laws of geometry are given using numerical coordinates and mathematical expressions. In the fields of engineering and architecture, such projections have the following important values: accuracy and precise measurements - allow for automatic calculation and verification of drawings using computer programs; automation - geometric objects can be numerically defined and automatically drawn in CAD (Computer-Aided Design) programs; 3D modeling - serves as an important basis for creating three-dimensional models. Numerical projections are widely used in the following areas: engineering graphics - for accurate projection of industrial details and structures, architecture - for developing projections of buildings and structures, geodesy and cartography - for determining the exact coordinates of the earth's surface, computer graphics and animation - for creating three-dimensional models.

Numerical projection methods have the following basic principles: a correct coordinate system - points, planes and bodies are defined using coordinates; projection relations - each geometric shape is described based on certain projection rules; mathematical formulas - changes in bodies in projections are carried out through precise mathematical calculations. Understanding numerical projections requires knowledge of the coordinate system, vector algebra and analytical geometry.

The use of modern educational technologies in teaching this topic is effective. The following methodological approaches are considered the most effective: the use of computer programs - conducting practical exercises using AutoCAD, SolidWorks and other engineering programs, practical examples and tasks - explaining each projection method with real-life examples, interactive learning - explaining the essence of projections to students through 3D modeling and visual technologies. Through these methods, students can clearly understand and apply numerically defined projections in practice.

Numerical projections are an important part of modern engineering and drawing geometry. This projection method provides greater accuracy, automation and easy modification compared to traditional projection methods. In order to effectively teach this topic, it is necessary to pay attention to the use of computer technology and practical exercises in the educational process.

Numerical projections are one of the important sections of geometry and are widely used in drawing geometry, engineering graphics and technical design. This method is used to determine the spatial location of objects and construct their projections. Three main parameters are used to define numerically defined projections based on the Cartesian coordinate system:  $\Delta x$  (length change),  $\Delta y$  (width change), and  $\Delta z$  (height change). Using these parameters, it is possible to accurately describe the dimensions of objects in space and their projections.

The word technology entered science in 1872. It comes from the Greek "techos" - craft, skill and "logos" - doctrine or science. In short, it means "science of skill". Today, some people think that pedagogical technology is only related to information technology and the use of TSO, computers, distance learning, or various techniques that must be used in the teaching process. This is not true. The main basis of pedagogical technology is the technologies selected by the teacher-trainer and students-students to jointly achieve a guaranteed result from the given goal. The expression "pedagogical technology" was first introduced in 1970 by the Japanese scientist T. Sakamoto. According to the scientist, pedagogical technology (teaching technology) is a field of knowledge related to a system of guidelines that ensure the acceptability of teaching. Professor N.F. Talizina believes that pedagogical technology consists in identifying rational methods for achieving a given educational goal. Professor N. Saidahmedov says that pedagogical technology is a project of a certain pedagogical system that can be implemented in practice. According to Professor M. Ochilov, pedagogical technology is a set of methods and techniques used in the learning process, taking into account the interaction of human potential and technical means, in order to facilitate the forms of education, guarantee their results and objectively evaluate them. This concept is defined by UNESCO as follows: pedagogical technology is a systematic (designed) method (method) for identifying, creating, and applying all processes of teaching and learning,

taking into account technical means, human potential and their interaction, in order to optimize the forms of education. Pedagogical technology is a set of methods and tools used in the learning process to achieve the intended goal of education. Pedagogical technology has existed for a long time, both old and new. However, as society develops, it increasingly sets new social demands on education, and the educational process is enriched and updated with modern advanced methods and techniques.

There are many areas of pedagogical technology. The current traditional education is the classroom system, which was formed in the 17th century on the basis of the didactic principles of Ya.A. Comenius and is currently the most widely used in schools around the world. Modern pedagogical technologies were created mainly to improve this system in various directions and are currently developing in various directions. They are pedagogical technologies based on improving the pedagogical process, directing it to the student; pedagogical technologies aimed at activating and intensifying student activity; pedagogical technologies based on didactic improvement and redevelopment of educational material; pedagogical technologies based on effective management and organization of the educational process; pedagogical technologies adapted to nature; developmental educational technologies, etc. [9].

The realization of the goal and the achievement of a guaranteed result in education depend on the collaborative activities of both the teacher and the student, as well as the goals they set, the chosen content, method, form, and means, that is, technology.

The choice of technology for the teacher and the student to achieve the goal is up to them, because the main goal of both parties is to achieve a specific result, in which the teacher selects the technology to be used depending on the level of knowledge of the students, the nature of the group, and the circumstances, for example, to achieve the result it is necessary to work with a computer, perhaps a film, handouts, drawings and posters, various literature, information technology will be needed, these depend on the teacher and the student.

At the same time, it is necessary to design the teaching process in advance, in this process the teacher must take into account the specifics of the subject, the place and conditions, the subject, and most importantly, the student's capabilities and needs, and the ability to organize collaborative activities, only then can the desired guaranteed result be achieved. In short, the student must be brought to the center of education.

In order for the teacher to see each lesson as a whole and visualize it, it is necessary to design the process of the upcoming lesson. In this case, it is of great importance for the teacher to draw up a technological map of the upcoming lesson, because the technological map of the lesson is drawn up for each topic, each lesson based on the nature of the subject, science being taught, the capabilities and needs of students. The technological map of the lesson can be compared to the scenario of all technological processes from the arrival of porcelain raw materials in the form of clay at the factory to the finished bowl.

It is not easy to draw up a technological map, because for this the teacher needs to be aware

of pedagogical, psychological, special methodologies and information technologies, as well as know a lot of methods and techniques. The colorfulness and interest of each lesson depends on the planned technological map of the lesson, carefully thought out in advance.

The form in which the technological map of the lesson is drawn up depends on the teacher's experience, goals and discretion. No matter how the technological map is drawn up, it should reflect the lesson process as a whole and fully reflect the clearly defined goal, task and guaranteed result, the technology of organizing the lesson process. The structure of the technological map frees the teacher from writing an extended lesson outline, since all aspects of the lesson process will be reflected in such a map.

The construction of the technological map, based on the capabilities and needs of the student, brings him to the center of education as a person. This makes it possible to increase the effectiveness of teaching.

Treating students as individuals in the teaching process, using various pedagogical technologies and modern methods, encourages them to think independently, freely, research, approach each issue creatively, feel responsible, conduct scientific research, analyze, use scientific literature effectively, and most importantly, increase their interest in reading, science, pedagogy, and their chosen profession.

#### References:

1. Uralovich, T. F. (2021). Conducting classes on fine arts based on information and communication technologies. *International Engineering Journal For Research & Development*, 6, 3-3.
2. Turapova, R. N. (2023). Mechanisms for Improving Children's Dialogical Speech. *Vital Annex: International Journal of Novel Research in Advanced Sciences*, 2(9), 49-53. Холмуродов, Ш. О. (2022). СИСТЕМА ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ В ОБРАЗОВАНИИ СТУДЕНТОВ-ИНФОРМАТИКОВ. *Digital*, 3(1), 1.
3. Uralovich, T. F. (2023). The Role Of Applied Art In The Development Of Aesthetic Skills Of Students. *International Journal of Advance Scientific Research*, 3(05), 111-118.
4. Urolovich, T. F. (2023, May). METHODOLOGICAL ASPECTS OF DEVELOPING AESTHETIC SKILLS IN FUTURE DRAWING TEACHERS. In *International Scientific and Current Research Conferences* (pp. 108-114).
5. Uralovich, T. F. (2023). PEDAGOGICAL CHARACTERISTICS OF DEVELOPING AESTHETIC SKILLS IN FUTURE DRAWING TEACHERS. *International Journal of Pedagogics*, 3(05), 139-144.
6. Xolmurodov, S. O. (2024). О 'QUVCHI TAFAKKURINI RIVOJLANTIRISHDA INTERFAOL METODLAR (O 'YINLAR) DAN FOYDALANISH (1-MODUL). *Inter education & global study*, (4 (1)), 188-196.

7. Turapova, R. B. (2025). VARIATIV YONDASHUV ASOSIDA O ‘QUVCHILARNING DIALOGIK NUTQINI RIVOJLANTIRISH DOLZARB MASALALARI. *Inter education & global study*, (3), 279-288.
8. Uralovich, T. F. (2024). THE MECHANISM OF FORMING AESTHETIC SKILLS OF STUDENTS THROUGH TEACHING THE SCIENCE OF DRAWING. *Ethiopian International Journal of Multidisciplinary Research*, 11(08), 36-38.
9. Uralovich, T. F. Conducting classes on fine arts based on information and communication technologies *International Engineering Journal For Research & Development*.-2021.
10. Toshpulatov, F. U. (2022). Murodaliyevna TF DEVELOPMENT OF THE SKILLS OF STUDENTS TO AVOID TYPICAL ERRORS WHEN PERFORMING CUTTING AND CUTTING. *Spectrum Journal of Innovation, Reforms and Development*, 5, 70-74.
11. Turapova, R. N. (2023). Mechanisms for Improving Children's Dialogical Speech. *Vital Annex: International Journal of Novel Research in Advanced Sciences*, 2(9), 49-53.
12. BAJARISHDA, T. F. Q. V. K. (2022). OQUVCHILARDA TIPIK XATOLARGA YOL QOYMASLIK KO ‘NIKALARINI RIVOJLANTIRISH. *Физико-технологического образования*.-2022, 4.
13. Toshpulatov, F. U. (2022). Issues of Developing the Culture of Measurement in Drawing Lessons (In the Case of General Secondary Schools). *Vital Annex: International Journal of Novel Research in Advanced Sciences*, 1(5), 111-119.
14. Toshpulatov, F. U., Mominov, B. K., & Mamatkulov, I. C. (2020). Determination of Sections of General Surfaces of the Second Order on Predetermined Circles. *The American Journal of Interdisciplinary Innovations and Research*, 2(11), 21-26.
15. Uralovich, T. F. (2023, May). METHODOLOGICAL ASPECTS OF DEVELOPING AESTHETIC SKILLS IN FUTURE DRAWING TEACHERS. In *International Scientific and Current Research Conferences* (pp. 108-114).
16. Uralovich, T. F. (2023). The Role Of Applied Art In The Development Of Aesthetic Skills Of Students. *International Journal of Advance Scientific Research*, 3(05), 111-118.