EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 04, April, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

FEATURES AND ANALYSIS OF TEACHING ENGINEERING AND COMPUTER GRAPHICS USING THE AUTOCAD PROGRAM

F.A.Abdurakhimova
Associate Professor Tashkent Institute of Textile and Light Industry

Abstract
Graphic training of students in technical fields is the basis of engineering education. Changes in state educational standards have led to a revision of the content and teaching methods of these academic disciplines. Professional competencies of many disciplines require students to master computer graphics tools.

Keywords: AUTOCAD program, engineering and computer graphics, descriptive geometry, engineering graphics, discipline, approaches to the content of the discipline, teaching methods.

Introduction

The article analyzes various approaches to the content and study of graphic teaching disciplines, which cause different opinions among teachers. The features of teaching the discipline "Engineering and Computer Graphics" in departments are considered.

The development of the working program of the discipline is an important component of the educational process. "Engineering and computer graphics" refers to the professional cycle of disciplines and is included in the basic (general professional) part of the curriculum for training bachelors in almost all areas in technical universities. The discipline consists of three modules "Descriptive Geometry", "Engineering Graphics", "Computer Graphics". Teaching the computer graphics section is focused on the use of the AutoCAD graphics editor to form the professional qualities of future specialists.

When presenting new theoretical material, it is recommended to use visualization lectures based on computer presentations and Internet resources. During practical classes, the student's activities include completing the task manually and then making drawings in the automated design system using 2D and 3D modeling. During independent work, the student makes a sketch using drawing tools and

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 04, April, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

completes homework, answering theoretical questions. This approach allows students to develop spatial imagi at the present stage of development of society, the solution of engineering problems is connected with the use of automated design systems based on electronic computing technology. Engineering and computer graphics form the basis of engineering education and form the basic knowledge necessary for studying special disciplines. In the mid-60s of the last century, a new section appeared in engineering graphics - computer (machine graphics) graphics, which is based on the theory of descriptive geometry and the basics of engineering graphics. The problems and methods of teaching computer graphics to students were studied by such scientists as Arapov V. M. [1], Oshkina L. M. [2], Karimov A. A., Rikhsiboev T. [3], Butkarev A. G., Rykov S. A. [4].nation, which will help in mastering the modules of this academic discipline.

State educational standards of higher professional education of the new generation implement a competence-based approach to training, which assumes that students acquire knowledge and experience for their further use in professional activities. "Engineering and computer graphics" refers to the professional cycle of disciplines and is included in the basic (general professional) part of the curriculum for training bachelors in many areas. As a result of mastering the discipline, the student should know:

State standards of the Unified System for Design Documentation (ESKD) required for the development and execution of graphic design documents (drawings and diagrams), including automated methods, rules for the execution of drawings of parts, assembly units, standard products, principles of constructing diagrams and methods for modeling geometric shapes in modern graphic CAD systems. Be able to mentally imagine the shape of objects and their relative position in space, execute and read drawings, use automated design tools to solve various problems (preparation of design documentation, geometric modeling).

Approaches to the content of graphic disciplines are different and cause a lot of controversy in the teaching environment. Representatives of the traditional school insist that descriptive geometry is a mandatory component of the geometric training of a future specialist, since it helps develop spatial thinking. In their opinion, students should study computer technologies for creating a drawing after mastering the methods of descriptive geometry. First, solving positional and metric problems, and then moving on to modern drawing technologies

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 04, April, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

Scientists believe that in the age of computer technology, computer graphics should be considered as a single whole with engineering graphics. Their opinion is confirmed by the fact that today in high school, drawing is not a compulsory subject, only in isolated cases an optional course. In each study group, up to 80% of students begin studying the discipline from scratch. They do not have spatial thinking and do not know how to organize independent work [3]. Let us cite research conducted by teachers of the Department of Engineering and Computer Graphics of TITLP. The authors conducted a survey and testing of first-year students before starting to study the discipline. Let us cite some of the results they obtained.

"First-year students show a virtually complete lack of synthesis of the holistic image of the object depicted in the drawing." "Based on two orthogonal projections, not a single student recognized the parallelepiped, and 14% of respondents recognized the right circular cone. Instead of the three-dimensional objects depicted in the drawing, the surveyed students recognized flat geometric figures: in the parallelepiped projections, they saw 2 rectangles (71%), and in the cone, various combinations of triangles, circles, and circles (57%)." The results of this study show a low level of teaching drawing in schools. Consequently, the learning process should be organized in such a way as to combine manual and computer drawing.

Teaching of engineering and computer graphics is conducted using the Autodesk software product [4] AutoCAD - a computer-aided design system for 2D and 3D modeling. The discipline consists of three modules: "Descriptive Geometry", "Engineering Graphics", "Computer Graphics". Work on the "Descriptive Geometry" module is performed by students on Whatman paper using drawing tools without the use of graphic editors. The "Engineering Graphics" module provides for solving problems in a traditional way with the subsequent use of a graphic editor. The "Computer Graphics" module introduces students to modern capabilities of CAD systems using the example of using the AutoCAD graphic editor.

Lectures are given in a multimedia classroom on the main sections of the discipline. At the end of the lecture, assignments are given for independent study. Hours are allocated for consultations for independent work of students, which are held in the computer lab outside of classes. During these hours, a teacher is present who

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 04, April, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

answers questions that have caused difficulties in solving typical problems, and also accepts work.

Practical classes are held in a specially equipped classroom equipped with computers for manual drawing. During the work, explanations are given on the topic in the form of mini-lectures (15-20 minutes), using presentations. This material is placed on the disk of the computer lab server, which allows students to complete assignments at their own pace. Each student receives their own individual assignment. At the first practical lesson on the topic "Studying the general rules for making drawings", students get acquainted with the AutoCAD program interface, setting up the workspace and completing the A4 sheet format.

The following three lessons on the first module "Descriptive Geometry" are performed on whatman paper. For greater clarity, it is allowed to use colored pencils, which contributes to a better perception and memorization of the topic. Therefore, in this academic year, students were asked to first solve graphic problems on paper with the writing of a report, which provides a detailed plan for completing the work, with further execution of the drawing on the computer. [5] Completing work on the topics "Views. Construction of simple sections" and "Construction of complex sections and inclined sections" studies the methods of forming a drawing and design in accordance with the requirements of the Unified System for Design Documentation (ESKD). At the first stage, students build a third projection based on two projections, perform the necessary sections and sections, and put down dimensions. At the second stage, they model three-dimensional objects using the AutoCAD program. [6] When computer modeling an object, it is necessary to frequently change the point of view, scaling, and move from one projection to another, which also allows developing spatial thinking and creativity. At the third stage of the work, the transformation into a projection drawing of a three-dimensional model is shown.

During the course of studying the discipline, students use methodological literature and Internet resources when independently working through the material.

With this approach, the study of computer graphics is not limited to an introductory level, but allows for a more complete study of the AutoCAD program. Working on computers is not just studying a graphics package, but a continuation of studying engineering graphics. [7],

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 04, April, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

Each bachelor studying geometric and graphic disciplines must be proficient in drawing tools and be able to draw in the traditional way, so manual drawing is indispensable. We believe that a combination of traditional and innovative methods for preparing engineering drawings will improve the overall level of professional training of students.

References

1. Arapov V. M. Selection of methods for teaching engineering graphics in the implementation of the Federal State Educational Standard for Bachelors. Electronic resource: http:// - 9187.
2. Oshkina L. M. Features of teaching the discipline "Computer Graphics" at the present stage. Electronic. Text data. - Access mode: marhdi.mrsu. ru / 2011-2 / PDF / 201.pdf. - Title from the screen.
3. Karimov A. A., Rikhsibaev T. Computer graphics // 2012, No. 6. Pp. 76 - 80.
4. Butkarev A. G., Rykov S. A. Formation of a drawing based on a solid model in AutoCAD: Tutorial. manual. SPb.: SPbGUNiPT, 2004. 355 p.
5. Bolbat O. B., Experience of using CAD in engineering graphic training of students of a technical university // Omsk Scientific Bulletin. 2012. No. 2 (110). P. 287 - 289.
6. Vanshina E. A. Volumetric modeling in teaching graphic and geometric disciplines at a university. Electronic resource (access mode): www.conference. osu.ru/assets/conf reports//435.doc._
7. Website http: // www.autodesk.ru.