

PRACTICE AND PRESSING ISSUES OF USING MODERN GRAPHIC SOFTWARE IN TEACHING CONSTRUCTION DRAWING

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This article explores the practical aspects and pressing issues of using modern graphic software in teaching the subject of construction drawing. With the widespread implementation of information and communication technologies today, the role of graphic software in developing students' spatial thinking is increasing. The use of programs such as AutoCAD, Revit, and ArchiCAD in the educational process deepens students' skills in designing and creating technical drawings. However, this process faces challenges related to infrastructure, instructional materials, and the professional readiness of educators. The article analyzes solutions to these issues, methodological approaches, and ways to increase the effectiveness of teaching.

INTRODUCTION. In recent years, due to the widespread introduction of graphic software in the teaching of "Architectural and Construction Drawings," computer graphics has emerged as a distinct subject. This subject has developed through integration with other disciplines and has become an inseparable part of the educational process. The course "Construction Drawing" is no exception. In combination with this course, graphic software has laid the groundwork for the emergence of a new discipline – computer-aided design.

The unique characteristic of this discipline is its ability to transition real objects into their models and vice versa. Converting volumetric shapes into flat drawings and vice versa preserves the geometric parameters of the shape and reconstructs its original spatial position. From this perspective, graphic software today serves not only as a didactic tool

that enhances focus in the study of construction drawing, but also as an object of study itself.

During the process of mastering computer-aided design, students learn to use automated projection systems. Analyses show that graphic programs like ArchiCAD are particularly noteworthy in this process. However, a coherent pedagogical system based on the logical consistency and continuity principles of didactics for using such programs has not yet been fully developed.

Furthermore, modern graphic software takes into account elements within the user interface (dialog window) that influence the student's spatial imagination — such as rotating the object, zooming in and out, isolating, and assembling. These features contribute to a comprehensive approach in teaching the subject of “Construction Drawing.”

Modern graphic software, especially ArchiCAD, incorporates possibilities such as 3D geometry, parametric modeling, and even 4D modeling, which significantly enhance the effectiveness of the educational process. ArchiCAD is widely used in design organizations and educational institutions, becoming a key tool in developing students' independent thinking and spatial reasoning.

Analysis results show that T.V. Chernyakova developed instructional methods for teaching computer graphics based on a modeling methodology. In her approach, she identified the interconnection of subject components, key principles, and teaching techniques. Similarly, O.A. Kraynova created a methodological system for teaching graphics in the field of informatics. Meanwhile, E.I. Ro'ziyev proposed a teaching methodology for the subject “Computer Graphics” within the integrative course “Graphics.”

However, specific methodological approaches for teaching the subject “Construction Drawing” using graphic software — especially based on comparative analysis of such programs — have not yet been sufficiently developed.

Therefore, it is necessary in the future to develop educational software, methodological manuals, and multimedia tools for computer modeling, synthetic analysis, and problem-solving in this subject, and to apply them in the practice of graphic education. This requires conducting scientific research based on specialized pedagogical and technical criteria.

The functional advantages of CAD graphic software — such as drawing, creating three-dimensional models, and generating their projections — serve as effective tools in teaching “Construction Drawing.” The use of such software not only supports the reproductive elements of the learning process but also promotes the development of variative, exploratory, and creative components. According to factor analysis based on statistical indicators, the content of the subject is being enriched by the functional capabilities of graphic software. In particular, the automated construction of orthogonal projections based on three-dimensional models of structures contributes to the improvement of the subject.

An innovative teaching methodology for the subject “Construction Drawing” has been developed based on a comparative study of ArchiCAD and other graphic software. One of

the pressing tasks in modern education is to develop the topics outlined in the curriculum using multimedia technologies and to present them based on modern computer technologies. Integrating computer technologies with traditional teaching methods ensures the effective assimilation of educational materials.

In particular, using multiple graphic software tools in teaching “Construction Drawing” enhances the effectiveness of preparing students for professional activities. Through both classroom and independent learning activities, students gain the ability to independently master the functionalities of these programs. Effectively organizing instructional time and comparing various graphic software systems is a key pedagogical tool in training competitive professionals.

A comparative approach helps develop students’ independent analytical thinking. This method encourages students to search for information, compare it, and analyze it. In this way, methods such as demonstrative explanation, research techniques, and problem-based learning complement one another during the lesson.

In the demonstrative explanation method, students absorb ready-made knowledge and retain it in memory. In the reproductive method, the teacher not only conveys knowledge but also analyzes it, while the student comprehends and accepts it. In the problem-based method, the teacher demonstrates steps to solve a problem, and students actively participate in the thinking process. In the research method, students acquire knowledge through independent exploration.

In today’s world, the ongoing process of computerization in all fields necessitates enhancing digital literacy among the younger generation. Therefore, teaching “Construction Drawing” using software such as AutoCAD, ArchiCAD, 3Ds Max, Lumion, and Revit plays a crucial role in shaping high-level professional competencies. These programs allow for the modeling, management, and analysis of complex processes not only in nature and society but also within the educational process itself.

Modern technologies help accelerate solutions in computation and design tasks. Especially in studying graphic assignments, the use of multimedia electronic textbooks, animated presentations, and illustrative examples makes the material more understandable and accessible for students.

In the research of Sh.D. Dilshodbekov, the research method of computer-assisted instruction is interpreted as a means of enhancing students’ creative and independent activity. This approach supports learning through play, experimentation, analysis, and reinforcement of knowledge.

In conclusion, the use of modern graphic software in teaching the subject of construction drawing is becoming an integral part of contemporary education. Graphic software such as AutoCAD, Revit, ArchiCAD, and SketchUp offers vast opportunities for developing students’ spatial thinking, technical competence, and practical skills. With the help of these

tools, students transition from traditional hand-drawing methods to digital design technologies, which play an important role in shaping their engineering mindset.

However, practical experience shows that there are several challenges hindering the effective use of graphic software. These include a shortage of technical equipment in educational facilities, outdated instructional materials, and insufficient proficiency among instructors in using modern software tools. Furthermore, in some cases, didactic approaches are not adequately applied to integrate the theoretical foundations of the subject with graphic software.

Therefore, to modernize the teaching of construction drawing, there is a need to align graphic software instruction with the professional training of teachers and updated curricula. To achieve this, it is necessary to: organize training courses to improve teachers' qualifications; develop digital teaching manuals; and equip educational institutions with appropriate technical infrastructure.

Overall, by developing effective teaching methods for graphic software and systematically addressing existing problems, the quality of construction drawing education can be significantly improved. This, in turn, contributes to enhancing the digital literacy of future builders and engineers.

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