

Intensive Training Using the Capabilities of Modern Graphic Programs in Developing the Practical Competences of Future Engineers

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ABSTRACT

The article analyzes scientific research on the development of practical competence of future civil engineers based on modern computer technologies. Organization of educational processes through graphic programs based on modern computer technologies. The effectiveness of using the capabilities of modern graphic programs in the development of students' practical competence is studied. The effectiveness of educational processes using modern computer technologies is discussed.

Keywords: Education, technology, practical competence, engineering, modern, construction, graphic programs.

INTRODUCTION

The Concept of the Development of the Higher Education System until 2030 of the President of the Republic of Uzbekistan No. PF-5847 dated October 8, 2019 was developed based on the needs of the social sphere and economic sectors of the higher education system, in order to improve the quality of education, train competitive personnel, effectively organize scientific and innovative activities, and develop international cooperation based on ensuring a strong integration of science, education and production, as well as in accordance with the implementation of the Decree of the President of the Republic of Uzbekistan No. PQ-4391 dated July 11, 2019 "On measures to introduce new principles of management in the system of higher and secondary specialized education". One of the main tasks of modernizing the education system is to develop the knowledge of students of the higher education system in the field, find their place in the labor market, contribute to the development of society, and thereby demonstrate their place in society. The desire to find one's place in society includes processes that are inextricably linked to the professional formation of students. The work being carried out in our country in this

regard is also bearing fruit. In particular, the Decree of the President of the Republic of Uzbekistan No. PF-60 dated January 28, 2022 "On the Development Strategy of New Uzbekistan for 2022–2026" [1,2].

Within the framework of the five priority areas of development of the Republic of Uzbekistan, the priority task is "to improve the system of continuous education, increase the quality of educational services and train highly qualified personnel in accordance with the modern needs of the labor market". This task, in turn, plays an important role in the social and economic development of the country. It is important to develop practical skills in students of higher educational institutions. They should focus on improving their spatial imagination, creative activity and skills in designing practical issues related to the field. These qualities are important in increasing the effectiveness of graphic education, since modern teaching methods help ensure the active participation of students. All areas of human activity are undergoing a process of computerization. This requires a rapid change in pedagogical technologies. At the current stage of social development, the issues of who should be trained in the

higher education system, what should be the content of education, and what forms and methods should be used to train specialists require new approaches.

The use of computer technologies, various detailed models, posters, and laboratory stands in teaching practical lessons in higher education institutions in the subject of "Energy-efficient engineering communications of buildings" is rapidly developing today. Nowadays, organizing teaching processes using computer technologies remains one of the most pressing issues.

LITERATURE ANALYSIS AND METHODOLOGY

Many scientists have conducted scientific research on the development of practical competencies in higher education institutions. In particular, Khudaiberganov, G.X. Formation of practical competencies of students in the higher education system [3], Nishonov, F.X., Azimov, Y.I., Development of professional practical competencies of students in higher education institutions [4], Mirzayev, S.S. Formation of practical research competencies of students in higher education institutions [5], Kayumov, N.Q., Khudaiberganov, G.X. Formation of professional and practical competencies of students in higher education institutions.[6].

Kh.Kh. Yusupov, A.T. Nurmanov, B.H. Torayev, J.A. Mamajonov, Sh.Kh. Boymurodov, J.T. Kholmurodov, R.Kh. Safarov, S.A. Qosimov, S.A. Otamurodov, B.A. Kholmurodov, N.Kh. Marovalar conducted scientific research and studies on the development of practical competencies in construction specialties.

According to the researcher J.Z. Madaminov [7], the basis of the process of professional and technological training of future engineers and their meaningful, active and creative project activities is engineering technology. The selection and development of all the natural, scientific, mathematical and engineering training content, which is important in preparing future engineers for professional and technological, organizational and managerial, analytical and modeling project activities, was considered a practical and active approach that allows you to have a complete idea of the engineering design activity, its tasks and the educational issues it solves, and the methods of its interaction.

According to researcher Y.A. Suyunova [8], based on the psychological and pedagogical aspects of the development

of practical knowledge in students, it can be said that this process has a certain impact on a number of their personal abilities and characteristics. In particular, it has an impact on: the development of cognitive interests, thinking skills; the development of motivation for effective learning and perfect mastery of topics; the student's aspirations, desires, interests; personal characteristics that cause the student to change his professional direction, etc.

From the analysis of the above scientific works and scientific research, it can be seen that not enough work has been done to analyze the methods of improving the development of practical competence of students based on the capabilities of modern graphic programs. In addition, it can be understood that it is impossible to train highly qualified personnel without computer tools and without taking into account software technologies in teaching the subject "Energy-saving engineering communications of buildings".

Students will have a clear idea of the construction processes during practical training using graphic software systems in design, and will understand that it is possible to control the implementation of the construction project. Teaching the subject "Energy-efficient engineering communications of buildings" in higher educational institutions of the republic through BIM technologies will allow students to carry out the design process in their field of specialization, acquire qualifications and skills, and create opportunities for them to engage in creative activities.

RESULTS

Today, technological tools and programs are bringing positive changes in the educational process, especially in the development of practical competencies. Students get the opportunity to gain not only theoretical knowledge, but also practical experience close to real life. Nowadays, organizing teaching processes using computer technologies remains an urgent issue. The subject of "Energy-efficient engineering communications of buildings" is one of the main subjects, and it is advisable to perform many tasks in this subject using computer technologies. Modern programs, such as AutoCAD, 3D Max, Corel Draw, Autodesk Revit and Lumion, help students solve complex tasks, as well as develop their practical competencies. Through these programs, students can not only apply their theoretical knowledge in practice, but also develop their creative thinking skills. Thus, the use

of technological tools in the educational process plays an important role in increasing the level of professionalism of students and preparing them as successful specialists in the future.

Nowadays, modern programs such as AutoCAD, 3D MAX, Autodesk Revit, ArchiCAD, and SketchUp are widely used in the design of construction drawings.

AutoCAD- is the most popular program that allows you to design construction drawings using a computer, developed by the American company Autodesk and is currently one of the world's leading graphic software for 2D and 3D design. AutoCAD is an abbreviation of the English word "Automatic Computer Aided Designer", which means automated computer assistance to the designer. The scope of the AutoCAD program in all technical fields is high.

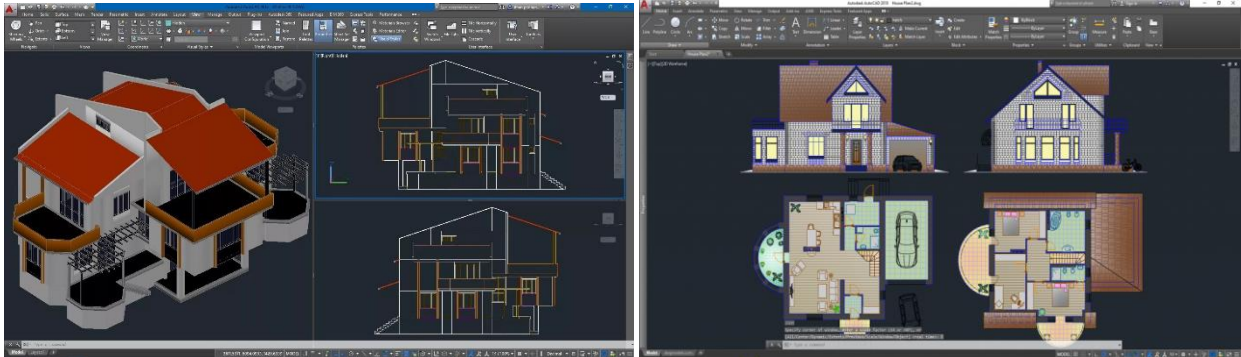


Figure 1: Modeling buildings in AutoCAD

Among a number of graphics programs for the simplicity and convenience of performing operations in AutoCAD, AutoCAD allows you to perform two- and three-dimensional design work with high accuracy based on the dimensions given for engineering and construction architectural drawings.

Although creating a three-dimensional model of construction drawings on a computer is somewhat more complex than two-dimensional design, it has several advantages:

1. Automatic intersection of object surfaces;
2. Ability to change situations by switching objects to the main and additional views;
3. Ability to visualize object surfaces;

4. View and observe modeled drawings from any point in space.

Autodesk Revit - A program created by Autodesk, it has gained a large number of users for its wide range of capabilities in the field of design, modeling two-dimensional and three-dimensional elements and structures. Autodesk Revit is a computer-aided design system, which is a modern program for use by engineers, designers, architects and representatives of related professions. The software allows a team of specialists to work on one object at the same time using building information modeling (BIM) technology. The program is responsible for the simultaneous work of several specialists within the framework of one project, while all changes and information are stored in a single centralized file. The approach helps to reduce time costs and improve communication between designers.

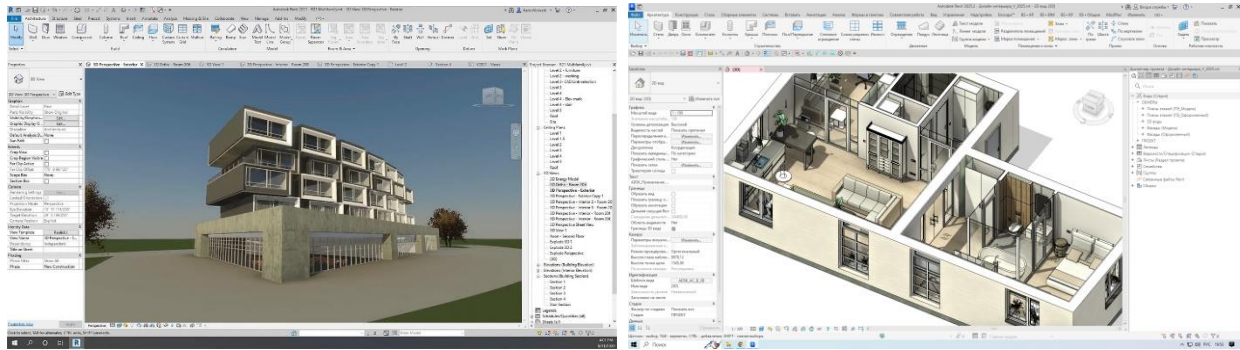


Figure 2: Modeling buildings in Autodesk Revit

Building Information Modeling Platform Autodesk Revit is designed to prepare construction and design documentation, including structural design, drawings and specifications necessary for a construction project. The building information model shows the structural dimensions of the designed object, design stages and quantitative indicators. In the Autodesk Revit model, each drawing sheet, two-dimensional or three-dimensional view and specifications are presented using data from a single database. In the drawings and specifications in Autodesk Revit, information about the building design is coordinated with all other stages of the project. The built-in parametric coordination system of Autodesk Revit changes allows you to automatically coordinate changes in any components of the project, such as model types, drawing sheets, specifications, cut types and plan types.

In addition, we will have the opportunity to more deeply reveal the essence of the subject of the animated electronic development “Energy-saving engineering communications of buildings” created using the graphics program we offer. In these animated electronic developments, you can view the prepared 3D model of the project buildings from all sides. The program allows you to automatically perform simple and complex cuts, which greatly simplifies the process. The ability to view all stages of the project from start to finish in the form of an animated video is one of the main achievements of this program. This makes the design process more understandable and interesting for students.

CONCLUSION

In conclusion, The existing problems in the process of teaching the subject "Energy-efficient engineering communications of buildings" were studied in detail. In teaching the subject, many factors were not paid attention

to, including the ability of students to draw, read, explain drawings, and develop their practical competence. The research conducted is one of the first attempts, which serves not only as a means of developing students' practical competence, but also as a means of presenting one of the technologies for raising students' graphic literacy to the required level. The possibilities of using educational tools in the learning process, namely, encouraging students to be active and think critically, to independently master the learning material, to learn to apply theoretical knowledge in practice, and to self-assess the knowledge gained, were studied, as well as details and general information about their advantages and the positive results expected from them. Recommendations were given.

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