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Research Article

MODERN REQUIREMENTS FOR TEACHING DESCRIPTIVE GEOMETRY AND PERSPECTIVES

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ABSTRACT

In this article, it can be seen from the fields of professional activity that currently there is not a single industry that computer technology has not penetrated. So, in order to produce a creatively thinking specialist who meets the requirements of the time, we first of all set one of the most urgent tasks for teachers -the formation of the ability of a mature expert in his field to apply computer technology on all fronts of his activity. Teaching geometry and perspective drawing highlights the advantages of computer-generated drawings, along with quality, accuracy and ease of use in the production process.

KEYWORDS

Modern technology, pedagogical technology, individual, parallel, computer graphics, animation, visual, design, undergraduate, engineering graphics, design.

INTRODUCTION

Currently, there is a growing interest in the use of interactive methods, innovative technologies, pedagogical and information technologies in the educational process. At the same time, mostly so far, students are taught to acquire ready-made knowledge, while modern technologies teach them to independently search for acquired knowledge, independently study and analyze it, and draw conclusions when possible. In this process, the teacher creates conditions for the development, formation, acquisition of knowledge and education of a

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personality and at the same time performs a managerial, guiding function.

The main feature of the subjects "Drawing Geometry", "Drawing" and "Drawing Geometry and Perspective" is that the theoretical material consists of a large amount of graphic information. The lectures explain the theoretical part of the course, as well as a large number of drawings. Practical classes in the subjects are aimed at a solid mastery of the theoretical material when solving individual problems and monitoring the assimilation of the educational material. The use of modern design programs leads to a simple solution to this problem.

At present, the structure of engineering graphics preparation can be divided into three types:

1. In parallel;

2. Full computerization;

3. In order.

The first type includes parallel learning: drawing geometry, drawing, drawing geometry and perspective are taught simultaneously. The second type is the transition to full computerization of graphic training. But this approach is more applicable to students who have certain "knowledge" and drawing skills. Otherwise, such an approach is considered simplified, since it contributes to the formation of a computer-dependent, narrowly focused specialist, and not an intellectually developed specialist capable of working creatively and solving any professional problems. The third type is sequential teaching of subjects (see Figure 1): drawing geometry - drawing - drawing geometry and perspective. In our opinion, such a step-by-step method of studying subjects has justified itself and is used in many higher educational institutions.

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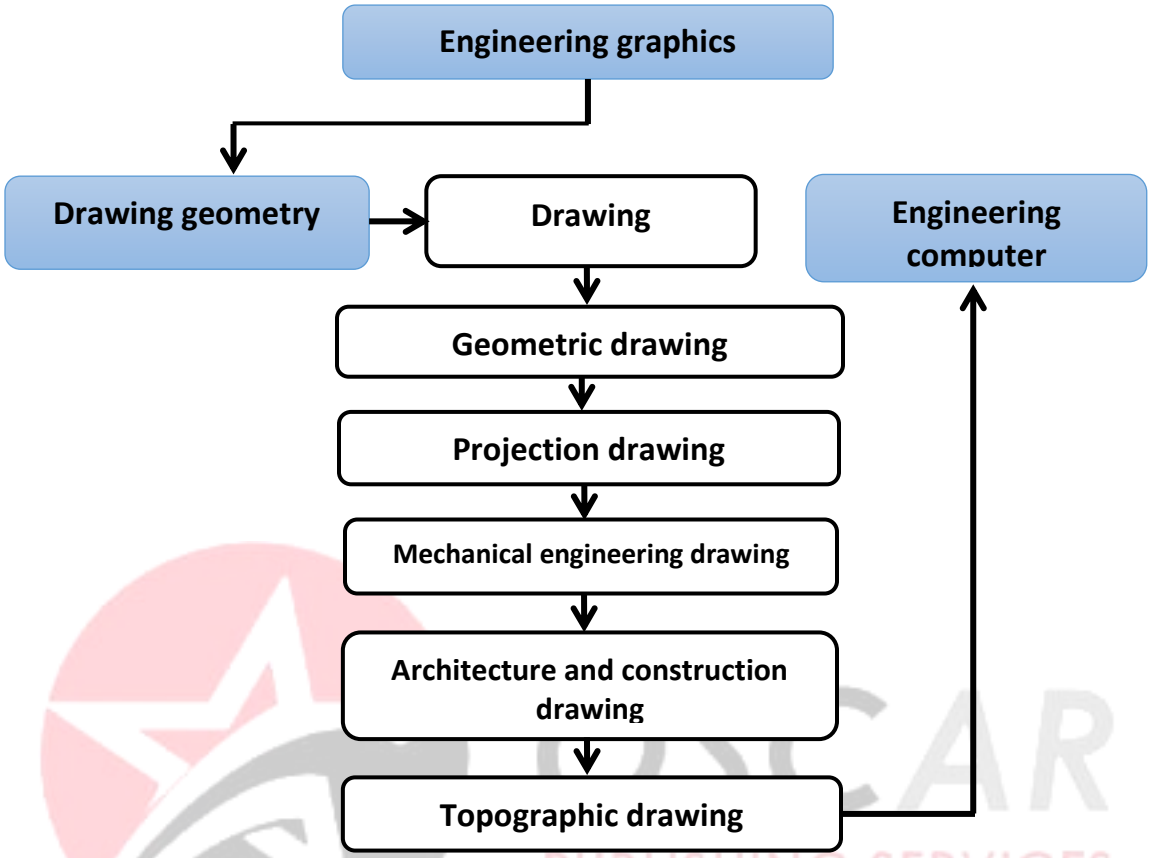

Figure 1. The structure of sequential teaching of engineering graphics

It allows teaching with the help of computer graphics, 3D modeling of objects, cutting, applying color schemes and showing sizes. Another advantage of computer technology is the modeling of processes that are very difficult or impossible to demonstrate in various real situations.

The use of computer graphics in teaching drawing geometry and drafting provides the following opportunities:

- joint use of modern computer and pedagogical technologies in the educational process;
- creation of an electronic textbook and its implementation in the educational process;
- creation of test questions with several answer options at different levels;
- creation of simulators;
- inclusion of lessons of leading teachers in the form of video lessons in the electronic textbook;
- creation of computer games on scientific topics;
- use of 3D graphic programs;

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- joint execution of graphic works in paper and computer versions;

- connection of educational material with real life.

According to Yu. G. Verstakova, "at present, it is impossible to imagine any area of human activity without computer graphics: visualization of scientific research, implementation of design and architectural solutions, creation of user interfaces, presentation sphere, television industry, medicine, etc."

The advent of personal computers and computer-aided design systems has led to the emergence of a new direction in engineering graphics - drawing geometry and perspective. This subject involves the use of computers in the educational process in engineering graphic sciences.

Computer graphics perform two functions: illustrative and cognitive. The illustrative function allows the viewer to present the researcher's idea, which only exists in the world, in the form of a visual design. The cognitive function helps the intellectual process of acquiring new knowledge, revealing the essence of a phenomenon, or at least getting an idea of this phenomenon with the help of some images.

Illustrative tasks of computer graphics are performed in the educational system when transferring knowledge presented by pre-prepared graphic, animation, audio and video images to students. The cognitive function is manifested when students obtain knowledge by conducting research on mathematical models of the objects and processes being studied.

In the study of engineering graphics, computer graphics becomes a new, progressive, convenient tool for creating drawings and other construction documentation. The use of graphic programs in the study of engineering graphics contributes to the development of students' scientific research and the strengthening of students' use of theoretical and practical knowledge. These are the main tasks facing higher education today.

Unlike flat images, a 3D computer model can be examined by rotating it on the screen at different angles, viewing it from different angles (top, bottom, side), and cropping it to analyze its internal surfaces. In the process of reading 3D computer models, they can be divided into individual elements (parts), as well as turned into a single integral product (assembly).

Students learning to draw planes often think that learning 3D modeling takes a long time and that creating solid spatial objects is more difficult than drawing planes. In fact, it turns out to be the opposite, as students learn when mastering spatial drawing.

Three-dimensional modeling in general, due to the possibility of in-depth development of drawings and projects, is considered one of the promising areas for improving the quality of education. The introduction of computer technologies of three-dimensional modeling into the educational process requires a revision of the established traditions of teaching engineering graphics. The most complete, accurate and visual source of information about an object is its volumetric model. If necessary, with its help, project documentation can be drawn up on electronic or paper media.

According to V.A. Nikolaev and A.D. Menshikova: "The main goal of a three-dimensional system is to reduce deadlines, improve the quality and technical and

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economic level of design results, automate the preparation of documentation, and improve the quality of design management. The use of computer-aided design (CAD) systems frees the manufacturer from labor-intensive repetitive drawing work, and also simplifies making changes to the design of the product."

Today, automated design systems are capable of performing not only 3D modeling, but also 4D modeling, i.e. parameterization, which significantly expands the scope of use. For example, the AutoCAD system is widely used in the education system: it allows for effective training on topics such as connections, types, cutting, sectioning, assembly drawings, and detailing. In addition, the system allows for the development of projects for machines and mechanisms, buildings, and structures. We do not always have the opportunity to demonstrate a specific educational object in its natural form; such an opportunity is provided by a virtual demonstration.

In modern conditions, active research is needed to combine the basic rules of classical engineering graphics with the principles and technologies of computer graphics, partly with three-dimensional electronic geometric modeling. Students must first learn to read drawings of parts and assemblies, perform graphic work, and create drawings and diagrams using drawing tools and without them. An important principle of graphic training is a rational combination of traditional and computer technologies.

The possibilities of computer technologies are not only to connect theory with practice, to automate some types of mechanical, routine work in drawing, geometry and advanced science classes, but also to increase the knowledge and creative activity of students, to help students fully realize their intellectual potential and should give them the opportunity to express emerging ideas vividly and fully, using modern means.

To determine the need to teach the science of "Drawing Geometry and Perspective" in the bachelor's degree program "60730100-Architecture (by type)", we first consider the professional activities of graduates of the educational direction in the qualification requirements. In this area, we will need to study the directions, professional tasks and requirements for the professional competencies of bachelor's degree graduates. We take a one-sided approach to the study of qualification requirements, that is, based on the content of our study, when determining the need to teach "Drawing Geometry and Perspective", we emphasize the coverage of only the aspects related to this subject (see Figure 2).

60730100-Architecture (by type) The areas of professional activity of our graduates are:

- Teaching activities in the subjects "Architecture (by type)" in comprehensive schools, specialized schools, academic lyceums and vocational educational institutions;

- Research activities in the areas of application of architecture (by type);

- Organizations developing and using scientific achievements, products and services in the field of architecture (by type).

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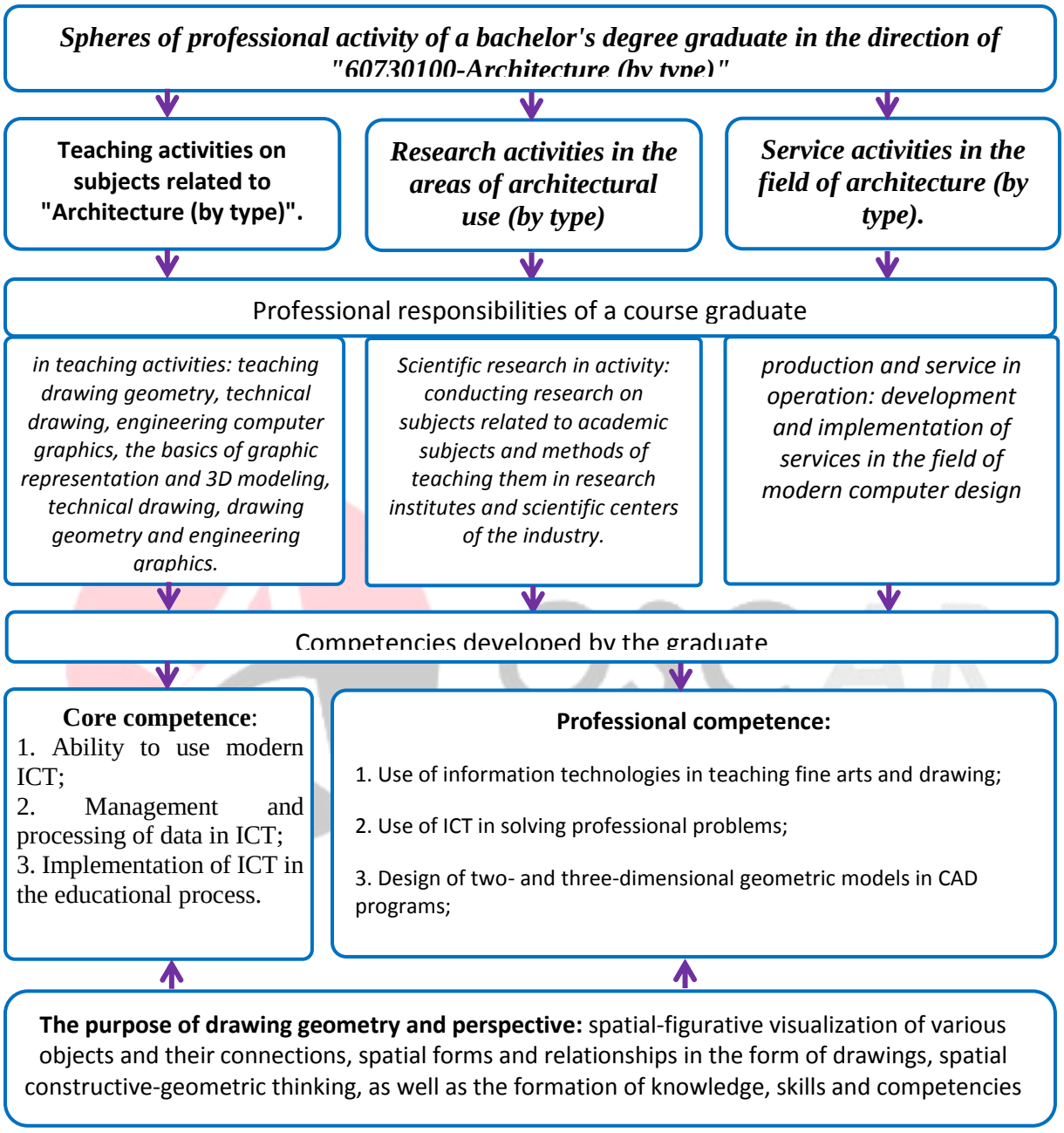

Figure 2. The need to teach the subject "Drawing Geometry and Perspective" in the bachelor's degree course "60730100-Architecture (by type)".

As can be seen from the graduate's professional activity areas, the phrase "Engineering graphics" is mentioned in all three of the above areas. Today, there is no area that does not include computer technology.

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Therefore, in order to prepare a creatively thinking specialist who meets the requirements of the time, we, teachers, face one of the most pressing tasks - to form in mature specialists in their field the ability to use computer technology in all aspects of their activities. Because drawing geometry and perspective must be carefully studied, this is a requirement of the time. Each new idea put forward in the student's work was previously "prepared" in drawings made by hand, using drawing tools, but now such work has to be done on a computer. Drawings made on a computer have a number of advantages in quality, accuracy and ease of use in the production process. But creating drawings with such qualities requires the designer to be fluent in computer graphics.

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