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Analysis of the Use of Computer Graphics in The Training of Future Engineers in Higher Educational Institutions

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Abstract: This article provides information on the proper selection, analysis, and application of computer technologies in the process of training future engineers in higher education institutions.

Keywords: Computer, teaching, pedagogical technology, engineer, multimedia, computer graphics, teaching methods.

Introduction: In world practice, ensuring the high quality of the teaching process is closely connected with the quality of the tasks carried out in industrial enterprises. This is achieved through the implementation of large-scale scientific research in the field of pedagogy.

The methodological basis of pedagogy consists of teaching and educating the younger generation in accordance with the stages of social development and traditions of upbringing. The quality of teaching in the theory of education depends on the characteristics of the educational process, its didactic support in the field of education, and pedagogical technologies. The content of education is formed by information about teaching methods, principles, stages, as well as modern information and computer technologies.

Modern pedagogy requires that individuals active in various spheres of social life be capable of withstanding market conditions, possess a high level of consciousness, think independently, serve as an example to others, and solve important issues as knowledgeable and well-rounded persons. Concepts such as pedagogical mastery, pedagogical abilities and their types, pedagogical techniques, pedagogical communication and its management methods, as well as pedagogical tact and pedagogical ethics, have taken

their rightful place.

In industry, modern technologies imply the proper organization of labor. The design of products and the technology of their production are carried out by highly qualified specialists. For this, they must possess skills in working with modern technologies. In fulfilling these tasks, in particular in teaching specialized subjects in higher educational institutions, the effective use of special software of modern information technologies and the proper organization of the learning process play an important role in development.

On the issues of applying information technologies in the process of teaching specialized subjects in higher education, research aimed at improving management in educational institutions has been carried out by scholars of our republic, scientists from the Commonwealth of Independent States (CIS) countries, and foreign researchers such as Z. Ismoilova, D.S. Ashurova, D. Himmataliyev, J. Hamidov, O. To'raqulov, A.V. Bogomolova, E.V. Ilyasheva, E.N. Koveshnikova, U.F. Katxanova, R.F. Makhutdinova, V. Zigert, L. Lan, P. Drucker, A. Fayol, F. Taylor, R. Harvey, A. Ingleby, M. Klugman, C. Liston, W. Piper, D. Smith, H. Kappel, A. Maslow, and B.W. Lehman. In our scientific research, the task has also been set to train highly qualified specialists for industrial enterprises by using modern computer technologies and special software in teaching, based on the specifics of technical higher education institutions. For this purpose, it is necessary to carry out a thorough analysis of computer technology and computer graphics.

The field of application of computer graphics is not limited to artistic effects alone. In all branches of science, engineering, medicine, as well as in commercial and managerial activities, computer-generated charts, graphs, and diagrams are used to visually represent various types of information. Designers, when developing new models of cars and airplanes, use three-dimensional graphic objects to present the final appearance of the product. Architects create three-dimensional images of buildings on a computer screen, which allows them to see how the structure will fit into the landscape.

The first computers were used only for solving scientific and industrial tasks. To better understand the obtained results, they were processed graphically, with charts, diagrams, and drawings of calculated structures being created. The first graphs produced by computers were obtained in symbolic printing mode.

The following areas of application of computer graphics can be considered.

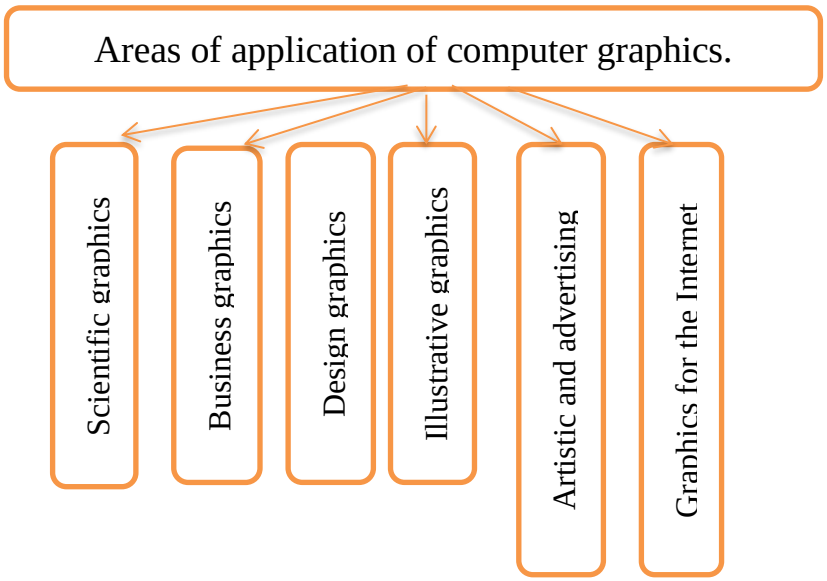

Figure 1. Areas of application of computer graphics.

Later, special devices-plotters-appeared, designed to draw diagrams and graphs with an ink pen on paper. Modern scientific computer graphics makes it possible to conduct computational experiments with a visual representation of their results.

Business graphics is a field of computer graphics designed for the visual representation of various performance indicators of institutions. Planned indicators, reporting documentation, and statistical summaries are the objects for which illustrative materials are created with the help of business graphics. Business graphics software tools are included as part of spreadsheets.

Design graphics are used in the work of design engineers, architects, and inventors of new technology. This type of computer graphics is an essential element

of CAD (Computer-Aided Design) systems. With the help of design graphics, it is possible to create both flat images (projections, sections) and three-dimensional spatial images.

Illustrative graphics is freehand drawing and drafting on a computer screen. Illustrative graphics packages belong to general-purpose application software. The simplest illustrative graphics tools are called graphic editors.

Artistic and advertising graphics became popular largely thanks to television. With the help of computers, advertising videos, cartoons, computer games, video lessons, and video presentations are created. Graphic packages for these purposes require significant computer resources in terms of speed and memory. A distinctive feature of these graphic packages is the ability to create realistic images and "moving pictures." The generation of drawings of three-dimensional objects, their rotations, zooming in and out, and deformations involves a large volume of calculations. Rendering the illumination of an object depending on the position of the light source, the placement of shadows, and the texture of the surface requires computations that take into account the laws of optics.

Computer animation is the creation of moving images on a display screen. The artist creates on the screen the drawings of the initial and final positions of moving objects, while all the intermediate states are calculated and displayed by the computer, based on the mathematical description of the given type of motion. The resulting drawings, shown sequentially on the screen at a certain frequency, create the illusion of movement. Multimedia is the combination of high-quality images on a computer screen with sound accompaniment. Multimedia systems have found the widest application in the fields of education, advertising, and entertainment.

The emergence of the global Internet has led to computer graphics taking an important place in it. Methods of transmitting visual information are constantly improving, more advanced graphic formats are being developed, and there is a growing desire to use three-dimensional graphics, animation, and the full range of multimedia.

In higher educational institutions, the number of students in the selected groups and their performance indicators in experimental trials determine how appropriately computer graphics have been chosen in accordance with the field of study. To achieve this, the results of the control and experimental groups were regularly analyzed and compared with each other, and conclusions were drawn. When necessary, the opinions expressed by the teachers directly involved in this process were thoroughly discussed. For this purpose, over a period of four years, we conducted research and observation work in the control and experimental groups. In the control groups, the teaching process was carried out on the basis of the existing traditional teaching method, while in the experimental groups, instruction was conducted using computer graphics as we proposed, based on the method of individualized teaching and learning. During the experiment, the results obtained at the beginning and at the end of the study in both the control and experimental groups were regularly analyzed, compared with each other, and conclusions were drawn.

Thus, the effectiveness of teaching students to perform engineering tasks using computer graphics based on the author's methodology was confirmed through statistical analysis of the experimental studies. By the end of the experimental work conducted in all higher educational institutions, the level of knowledge of the students in the experimental group was higher compared to that of the control group. This indicates the effectiveness of the research carried out.

To ensure the reliability of the experimental results, mathematical and statistical processing was carried out by us.

References

1. Абдуллаева Ш.А. ПЕДАГОГИКА Тошкент - 2004—С.4-6
2. Щегрикович Д.В · ОБЛАСТИ ПРИМЕНЕНИЯ КОМПЬЮТЕРНОЙ ГРАФИКИ. 2012 —С.9-11
3. Гафурова С. С. ПРОФЕССИОНАЛЬНОЕ ДОЛГОЛЕТИЕ УЧИТЕЛЯ-ВОСПИТАТЕЛЯ //Advances in Science and Technology. – 2019. – С. 224-226.
4. Абдукаримов Х., Гафурова С. С. ПРОФЕССИОНАЛЬНОЕ ВОСПИТАНИЕ ЛИЧНОСТИ УЧИТЕЛЯ-ВОСПИТАТЕЛЯ //SCIENCE AND WORLD. – 2013. – С. 25.
5. Гофурова А. Kasb talim dizayn yo'nalishida ixtisoslik fanlarini 3D texnologiyalaridan foydalanib o'qitishning axborot dedaktik taminoti //Новый Узбекистан: наука, образование и инновации. – 2024. – Т. 1. – №. 1. – С. 559-562.
6. Abdukarimov K., Gofurova S. The Technology of the Advanced And Innovatory Experience in the Process of the Constant Pedagogical Education //Young Scientist USA. – 2015. – С. 49-51.