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Development Of Engineering Students' Drawing Skills For Field-Related Drawing Projects

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A B S T R A C T

The article provides suggestions for using SAD design systems as a tool for students to visualize complex drawings used in the technical field

A R T I C L E I N F O

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In the process of rapid development of development, scientific and technical progress is reflected as a result of unprecedented achievements, inventions and discoveries. The basis of this development is people with high talents. Specialists with a highly developed level of thinking are creating various material, household and similar technical tools that make people comfortable by creating new ideas and showing their positive solutions. Prowardida is working for human interests.

Works in the field of engineering, technology, construction, architecture are a vivid example of this. The results achieved in the construction of various buildings and facilities, automobile industry, etc., create comfort for people. Therefore, one of the urgent issues today is the training of qualified personnel. Professors-teachers have a great responsibility to train the specialists being trained in higher technical educational institutions based on the requirements of the times and to develop their creative abilities.

One of the urgent problems facing society is the training of qualified personnel, and in order to solve this problem, it is necessary to effectively use information and communication technologies (ICT) and modern technologies in the organization of the educational process[1]. The possibility of computer modeling facilitates the teaching of technical sciences. Practical work is being carried out on the use of modern computer technologies in the teaching of drawing geometry and engineering graphics, which are the basis of technical sciences and its language. As a result, there was a need for complete computerization of science teaching. For this purpose, it is necessary to organize computer training on the topics specified in the science program. Today, great importance is attached to the process of independent education. During lectures and practical lessons on subjects, the teacher does not have time to fully convey the necessary knowledge to students. The teacher guides the student as a consultant in using the necessary resources. It can convey the basic concepts of science to students by accelerating the learning process. In graphic subjects, it is necessary to select and organize the use of ICT according to the type of lesson in order to convey complex drawings and their drawing,

to develop students' spatial imagination, etc. in a short time and to ensure their mastery. Therefore, in teaching this subject, first of all, it is necessary to ensure that the teacher can use computer software without the help of others.

The use of ICT in the teaching of the engineering graphics section of the science course is of great help. Because in this department mainly practical works, i.e. projects related to various detailed models, devices and equipment are carried out. For example, seeing detailed models from different angles, cutting them, is important for the development of students' spatial imagination. To do this, it is necessary to make wider use of the possibilities of computer modeling. In computer software today, special program packages have been created for all areas, with the help of which it is possible to solve time-consuming issues quickly and qualitatively. There are CAD design systems for drawing geometry and engineering graphics. These include AutoCAD, ArchiCAD, AutoCAD Mechanical, AutoCAD Inventor Professional Suite, and more. Among them, the AutoCAD graphics program helps in effective teaching of engineering graphics, drawing and similar subjects.

CAD design systems are effective in solving design problems in science and explaining them to students. Because the sequence of creating projects in these programs is simple, and the high level of design attracts the attention of the user. This set of programs was considered the most convenient and advantageous in ensuring a high level of presentation (colors, materials, textures, gradients, shadows, etc.). Science teachers should prepare and use various visual aids in CAD design systems for the teaching process.

Connecting theoretical knowledge with practice and life experiences is one of the leading rules of education. Achievements in the field of education are primarily based on the interdependence of theory and practice [2]. Only then will the student understand the essence of the learning materials he is studying and will be able to use them in practice. For this, the teacher should ensure the active participation of students in the educational process. Active participation leads to conscious and understanding acquisition of knowledge.

Awareness and activity in education, high mood in the student, desire to know more, encourages independent thinking and drawing conclusions . Conscious and active acquisition of knowledge is expressed in the psychological aspects of the teaching process. In the process of teaching drawing geometry and engineering graphics, the development of students' spatial imagination is considered a constant problem. With the help of ICT, it is possible to develop students' spatial imagination and develop creative thinking and creativity skills. Due to the purposeful use of theoretically based products of modern multimedia technologies, it is possible to convey a large amount of information in a short period of time and ensure the acquisition of the given material [2]. Task in Figure 1: Read the cumulative unit. If students are given a graphic task and explained without using computer technologies, only some requirements can achieve the expected results. If the practical graphic assignment execution algorithm is shown dynamically (animated) and the 3D model of the assignment through the computer's multimedia capabilities, students will have a clear idea of the overall unit. Then students can complete the given practical graphic task and get the necessary information.

As a result of the presence of various materials used in the course of the lesson in multimedia electronic form, it provides all-round convenience to teachers and students. For example, if during the practical lesson, the graphic will help the teacher in the matter of time in showing the example of the assignment, it will be easy for the students to be interested and understand them based on the principles of presentation and comprehensibility. The visual capabilities of the computer are highly effective in creating various animation sequences [3] .

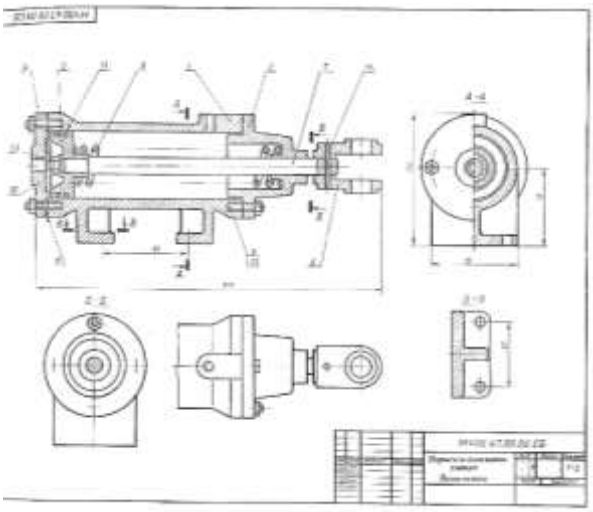

Figure 1. Aggregate unit

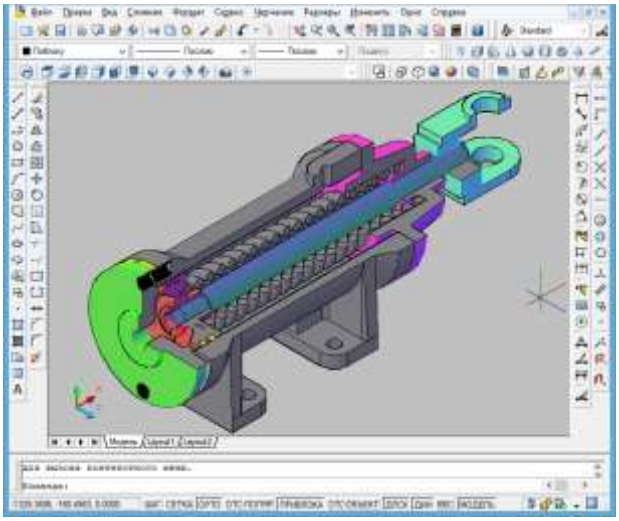

Figure 2. A virtual model of the assembly unit

It is convenient to create a 3D model of the drawings given on the computer in the AutoCAD graphics program. The created 3D model can be processed using the Autodesk Inventor Fusion program, that is, it can be provided with a high level of presentation. In this program, it is easier to edit the desired part of the 3D model compared to the AutoCAD graphic program.

The 3D model of the assembly shown in Figure 2 was created in the AutoCAD graphics program, and it can be viewed and edited from different angles. It is broken down into details and its assembly procedure is shown. By showing this process to students in the lesson, an opportunity is created to attract their attention, to develop their thinking and, most importantly, their spatial imagination.

In conclusion, it should be emphasized that the expected results can be achieved as a result of the use of computer graphics in increasing the quality and efficiency of education. As a result of the use of various modern computer programs in the teaching of drawing geometry and engineering graphics, students have a positive effect on reading drawings and imagining their models. The use of multimedia computer technologies in the teaching of drawing geometry and engineering graphics helps students to become mature professionals.

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