

**TOOLS FOR DEVELOPING STUDENTS' DESIGN SKILLS IN TECHNICAL  
FIELDS**

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**Abstract:** The article presents ways and means of developing the skills of students to create new ideas in the process of drawing, reading, and designing projects.

**Key words:** project, computer graphics, imagination, sketch, modeling.

The most important factor of leading countries in the world is increasing due to potential, competitive personnel, personnel with high professional experience. Of course, where science is developed, new ideas, initiatives, and new technologies will continue to grow. The training of competent personnel is carried out in an unbroken chain, that is, continuous education, from school to higher education institutions. In the new Uzbekistan, intensive work is being carried out on the legal basis and implementation mechanisms aimed at fundamentally revising the content of continuous education, developing it, and most importantly, improving the quality of education. As a result of this, it can be seen in the example of personnel who are coming out with their ideas and initiatives in the world arena today.

In the process of rapid development of society, 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. The results of the creation of various material, household and similar technical means that create comfort for people by creating new ideas and showing their positive solutions are becoming apparent.

Especially the work in the field of technology is a vivid example of this. The results achieved in the construction of various buildings and structures, automobile industry, etc. are provided based on the convenience of people. Therefore, one of the urgent issues today is the training of qualified personnel. In order to train the specialists being trained in technical higher education institutions based on the requirements of the times and to develop their creative abilities, professors and teachers need to organize educational processes using new methods and tools.

One of the urgent problems of today 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, construction-architectural subjects. It is necessary to organize teaching through the possibilities of computer graphics on the topics indicated in the science program. Today, great importance is attached to the process of independent education.

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| <b>1</b> | <b>ISSN 2349-7793 (online), Published by INTERNATIONAL JOURNAL OF RESEARCH IN<br/>COMMERCE, IT, ENGINEERING AND SOCIAL SCIENCES,<br/>under Volume: 17 Issue: 08 in August-2023<br/><a href="https://www.gejournal.net/index.php/IJRCIESS">https://www.gejournal.net/index.php/IJRCIESS</a></b>          |
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During lectures and practical lessons on subjects, the professor does not have time to fully convey the necessary knowledge to the students. The faculty member instructs the student in the use of appropriate resources as a consultant. Digitalization of the educational process and the use of modern tools can convey the basic concepts of science to students. It is necessary to select and organize the use of digital methodological support according to the type of lesson in order to convey complex drawings and their drawing, develop spatial imagination in students, etc. in a short time and ensure their mastery. Therefore, in teaching this subject, first of all, it is necessary to ensure that the professor-teacher can widely use modern computer software.

CAD design systems have a positive effect on students in the implementation of construction issues in design sciences, problems and projects related to mechanical engineering, transport, agriculture. 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.

Modeling is a clear and comprehensible representation of the real phenomenon and process of the studied research object in a certain area. The following types of modeling can be used in the teaching of graphic sciences: computer modeling and graphic and geometric modeling.

The modeling process includes three elements:

- subject (researcher);
- research object;
- a model that defines (reflects) the relationship between the conscious subject and the perceived object.

**Computer modeling** – presentation of mathematical and geometrical modeling in virtual form. Computer modeling can be used in many fields. Wide use in all types of electronics, energy, chemistry and biology, architecture, design, and engineering fields is showing good results today. In particular, it is possible to model various drawings, details, layouts from the subject "Drawing geometry and engineering graphics" using computer graphics.

**Virtual modeling** - it is said to model details, items, mechanisms, structures and others using computer graphics. In addition, it makes it possible to easily and inexpensively perform various editing tasks on virtual models (cutting, cutting, carving, adding elements, coloring, giving materials, etc.). The use of virtual modeling in conducting experiments provides great economic efficiency [12].

The role of practical lessons is incomparable for the application of theoretical knowledge in practice, for students to be able to apply their acquired knowledge, and to turn it into skills. Based on this, the student can understand the true nature of the theoretical material he is studying. If it is possible to ensure that the students are able to analyze the information they are receiving, to isolate the part they need, then their mastery of the knowledge given by the teacher will be high. By motivating the students in their field by the teacher, it makes them active. As a result, students learn knowledge consciously and with understanding.

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| <b>2</b> | ISSN 2349-7793 (online), Published by INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE, IT, ENGINEERING AND SOCIAL SCIENCES,<br>under Volume: 17 Issue: 08 in August-2023<br><a href="https://www.gejournal.net/index.php/IJRCIESS">https://www.gejournal.net/index.php/IJRCIESS</a>        |
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Conscious and active assimilation of the given knowledge, organization of the teaching process taking into account the pedagogical and psychological aspects of the students is an important factor. In this, the professor-teacher presents to the students the sketch samples of the selected project. Students should first draw a sketch by hand and form a drawing view. By drawing by hand, students get new ideas. During the drawing process, they help to imagine how the project will be in real life. If the students do not have enough idea of what the project will look like beforehand, the professor will help to develop the ability to imagine by showing its 3D model using the capabilities of computer graphics.

If students are given a graphic task and explained without using computer technologies, only some requirements can achieve the expected results. If the algorithm of implementation of practical projects is shown in a dynamic (animated) form and the 3D model of the project is shown in a virtual way through the multimedia capabilities of the computer, students will have a clear idea about the object being created. Then it is possible to complete the task selected by the students or presented to them and get the necessary information.

As a result of the presentation of various materials used in the course of the lesson in a multimedia electronic format, it provides all-round convenience to teachers and students. For example, if the teacher helps the teacher to save time by drawing a sample task during the practical lesson, it will be easier for students to be interested and understand them based on the principles of visualization and comprehensibility. The computer's visual capabilities are highly effective in creating various animation sequences [3].

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.

A science teacher can create detailed models of subjects, building models in AutoCAD and use them in the course of the lesson. The created virtual models can be viewed from different angles, cut, change the color of the model, automatically resize and many other features using the wide range of features of the AutoCAD program.

By mastering the most basic factors such as perfect understanding of the drawing project, imagination, teachers of the specialty should be able to reveal the mature staff. As a result, the attitude to the profession, interest, and the requirements for the training of high-potential personnel in the field can be met.

Table-1

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| Methods of explaining tasks in graphic sciences |  |
| Hand drawing (on the board)                     | With the help of dynamic (animation) computer technologies |

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| Drawing a graphic sample of projects to be implemented on the board is time-consuming and of poor quality. It is necessary to draw repeatedly in every lesson. | It is the basis for the high level of presentation (colors, materials, etc.) by preparing a sample of the graphic tasks of the projects in a multimedia animated form with the help of IT and creating a 3D model of the projects. The possibility of replaying stored (hdd, flash, googledisk, etc.) educational material serves as an assistant (repetitor) to students in the process of independent and distance education. |
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In conclusion, it should be noted that the use of modern computer programs and graphics in improving the quality and efficiency of education in the fields of technology, transport, mechanical engineering, and agriculture is the basis for fulfilling the state educational standards. As a result of the use of various modern computer programs in the development of design skills in engineering education students, it has a positive effect on students' ability to draw, read, imagine their models, and search for new ideas. The use of modern computer programs and graphics in the teaching of graphics subjects helps students become competitive professionals.

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