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Methodology of Teaching the Science of Drawing for Future Educators Using Graphic Programs

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Abstract: The construction drawing course at the university is aimed at shaping the graphic culture of students, as well as the creative potential of the individual.

Keywords: Standard, drawing board, student, effective lesson, concept, necessity, drawing, training, sequence, membership, didactic requirement.

The Action Strategy for the five priority areas of development of the Republic of Uzbekistan sets the priority task of "further improving the system of continuing education, increasing access to quality educational services, continuing the policy of training highly qualified personnel in line with modern needs of the labor market." A key factor in the development of design skills of students of higher education institutions is their spatial imagination, creative activity, the ability to design practical problems in the field, these qualities are important in improving the effectiveness of graphic education.

Extensive use of computers by students serves to accelerate the development of science and technology in society and, on this basis, to achieve socio-economic development. "Introduction of modern forms and methods of teaching, computer and information and communication technologies in the educational process, provision of higher education institutions with modern teaching and laboratory equipment and teaching materials, research and development. support and encourage innovation, train competitive personnel based on the establishment and development of modern scientific laboratories of higher education institutions and be able to demonstrate their professional mobility and creativity.

Computerization of all spheres of human activity has led to changes in centuries-old pedagogical technologies. New means of teaching forced to reconsider the main issues of pedagogical science: who is taught in the higher education system at the current stage of development of society, what is the content of education, what is the basis for higher education? forms and methods should be used.

In view of the above, we consider the revision of the content of the science of engineering computer graphics to be one of the most pressing problems in the teaching of this science. In reorganizing the content of the science of engineering computer graphics, it is expedient to take into account the achievements of today's science and technology.

If we divide the content and procedural aspects of education into two, then the traditional didactic principles can be conditionally divided into these two groups. The conditionality of the separation of didactic principles in this form is classified by their interdependence and interdependence.

We agree with ZK Meretukova and AR Chinazirova. They should take into account the fact that the principle of science in education is "scientific pluralism" in the structure of education. Different

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approaches to the same scientific problem encourage students to broaden their horizons and search for the truth. ”

G.M. Chernobelska's views can be understood from the last words of the quote: "The scientificity of the content is achieved not only by imparting ready knowledge to students, but also by acquainting them with the methods of scientific research."

The principle of comprehensibility. The most important principle of teaching is the principle of comprehension. When learning new material, students face difficulties, firstly, in the content of the information, and secondly, in the way it is presented. The first type of difficulty is related to the student's thesaurus. That is, the student's understanding of the world is linked to a system of interconnected ideas. Such difficulties are called thesaurus information barriers. The thesaurus of all students is different, which does not mean that the information barrier that one student faces is the same as that of another student.

The principle of comprehensibility in higher education has been studied in the work of OV Romanova. Examining the impact of the new information environment on the learning process, the author notes that the educational process “takes into account the fact that students receive large amounts of information from the global information space and independently. The traditional structure of the principle is expanding. The information that students receive and turn into knowledge must be scientific, so students must be able to distinguish real scientific knowledge from pseudo-scientific knowledge. ”

The principle of connecting theory with practice. “This principle is based on the following rules: students' own social experience should be taken into account in teaching practice; direct the learning process to solve important problems for students (social, economic, environmental, political); the close relationship between training and industrial labor in the national economy; mass media, periodicals ».

The principle of consistency. EV Eliseeva believes that the guiding principle in the selection of content in modern conditions should be the principle of consistency: "provides a view of a pedagogically based system of interrelated learning information." The principle of coherence requires the content developer to incorporate into the content of the science the educational knowledge that is embedded in all the conceptual systems of the science and that illuminates its essence.

Principles of content creation:

The principle of continuity. I.P. Podlasiy said that “the educational process consists of separate steps, which will be more successful if it continues without breaks, disruption of continuity, uncontrollable situations. If you don't practice your skills regularly, they will disappear. ”

The principle of membership. The concepts of the principles of continuity and continuity are described in the "Didactics" of LV Zagrekova and VV Nikolina: In this case, the information is based on the previous one and prepares to learn new information.

The principle of continuity. The principles considered in the formulation of educational content are closely related to the principle of continuity, which directs content developers to take into account interdisciplinary and interdisciplinary relationships. "Excessive interdisciplinary connections that fill the learning environment have increased the demand for educators."

In order to bring the teaching of "Building Chemistry" to the level of modern requirements, the collection of information on the topics specified in the science program and their processing using multimedia computer technology is a topical issue today. The use of modern computer technology

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in the educational process should be carried out in parallel, without denying the pedagogical technology. After all, such an approach gives the expected result in the effective use of graphic materials. It is no exaggeration to say that the use of graphics software, especially in the teaching of construction drawing, is the only way to achieve the expected results. The name of the subject itself requires the use of graphics programs. Until now, the main reasons for not drawing construction drawings in accordance with graphics programs were the lack of teachers who knew graphics programs and the lack of demand for classrooms. However, in the current era of development, the organization of classes without the use of graphics programs does not meet modern educational standards.

One of the most important tasks today in teaching the subject of "Construction Drawing" is to ensure the coherence of topics, the use of the most modern methods and tools of teaching. All the subjects of the studied science serve as a basis for each other. This requires the teacher to work tirelessly on himself, as the construction design keeps pace with the changes. Initially, the training of teachers to meet these requirements is another important issue.

In the teaching of the subject "Construction Drawing" it is necessary to summarize and analyze the information on the subject in the development of the curriculum, based on the curriculum.

Using the rich potential of modern computer technology, it is necessary to redraw drawings, give them animations, make them multimedia. Especially when multimedia drawings attract students' attention, their attitude towards science changes. Students will also have the opportunity to learn more about the diagram. While modern software tools related to computer graphics, such as ArchiCAD, AutoCAD, 3dMax, and other programs, help the teacher in teaching science, they help students to understand the meaning of science, spatial imagination, creativity, and leads to the development of logical thinking skills, improving the performance of science. It is advisable to use computer graphics to process the collected data.

Computer graphics is one of the most complex synthetic resources. It emerged and evolved as a result of combining graphics with modern devices and technological solutions to help engineers implement innovative ideas.

In fact, pictures and drawings are not created naturally. These images are artificial - created by the human mind, emotions and hands. Man creates them to convey information about the objects being depicted, and they act as graphic models for perceiving, understanding, and depicting those objects. In its form, a picture is a graphical model of perception and understanding of an object, and a drawing is a geometric model of understanding and scientific perception of an object.

According to M.Yu. Filimonova: "... computer graphics systems cannot be fully studied even by professionals and programmers. Therefore, it is not advisable to force students to study the whole system. You just have to be more discriminating with the help you render toward other people. This, in turn, requires new modern teaching methods. All of the above applies not only to computer graphics systems, but also to the study of other complex software systems. "

Computer graphics are divided into the following sections depending on the field of application:

- scientific graphics;
- business schedule;
- design graphics;
- illustrative graphics;
- advertising and image graphics;

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- computer animation;
- multimedia.

Scientific graphics - is a visual representation of research objects, graphical processing of research results.

Business graphics is the creation of illustrations used in the activities of various institutions. Examples of visual aids created using business graphics include planning indicators, reporting documents, and statistical reports.

Design graphics is a section that allows you to create an electronic drawing of an object and its three-dimensional model. The created three-dimensional model allows you to test various effects in a virtual environment.

Illustrative graphics - allows the user to work on a computer in special programs, as if drawing freely on paper with a pen, brush, paint and other tools.

Advertising and image graphics - allows you to use your computer to create cartoons, computer games, video presentations and advertisements.

Computer animation is a sequence of moving images on the screen. The user enters the initial and final states of the moving objects on the screen, and all intermediate states are automatically calculated by the computer.

Multimedia is a combination of audio and high quality image on a computer screen. Multimedia is widely used in education, advertising and entertainment.

Computer graphics can be used as a tool in the design of construction drawings to help visualize a variety of design work, buildings, roofing, and more.

Animated materials help students develop spatial imagination and deep thinking. This is due to the fact that the given drawings are shown in space and in the plane, as well as in the form of multimedia using a wide range of computer technologies. As an example, give the history of a complex building. By synthesizing this given history, students visualize the building. But because not all students have the same abilities, certain students cannot imagine the overall look of a building. Therefore, in addition to showing the projections of complex buildings, it is possible to develop students' spatial imagination by showing its 3D model. The general appearance of the building can be expressed through animations. Student-led animation makes them easier to master.

Parallel application of animations along with animations will help to improve the quality of the lesson. Almost all subjects in the field of construction drawing require a combination of theory and practice. If the combination of theory and practice is not provided, students will have gaps in their understanding. Therefore, it is necessary to simultaneously demonstrate the theories that are relevant to the animated film and the theme on the screen.

3D modeling is a journey into a world where the designer's ideas are stunningly realistic and realistic on a computer screen. It's as if you reach out and touch something that you can only imagine.

In 3D modeling systems, the three-dimensional model is usually displayed on the monitor screen as an arbitrary parallel projection (axonometry). Standard views are displayed on the corresponding panel and include orthogonal and standard isometric projections. The T-VIEW and T-DRAW commands are used to automatically create orthogonal projections from the 3D model. Thus, the task of constructing a geometric image of the geometry directly on the plane (monitor screen) on the basis of a spatial object (3D model) is performed.

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The structure of geometric modeling includes the following 4 components:

1. Original or modeling object. When modeling three-dimensional space, orthogonal projections, axonometry, perspective, and numerical projections are obtained on the monitor screen. In addition, modeling objects can be multidimensional and nonlinear models that are relevant and unresolved for any other modern science.
2. The model area is the carrier of the model being described. Typically, this is a monitor screen, but other methods can be used to display the model.
3. The modeling apparatus determines the methods of rendering 3D models.

They are:

- analytical;
- kinematic;
- constructive;
- parameter;
- mixed methods.

4. Models are divided into frame, surface and solid models.

The video presentation of a 3D drawing created with the help of computer graphics software shows it to the students as if it were real life and is understandable to the students and develops their spatial imagination. The reason is that the development of spatial imagination in students leads to an understanding of science. After all, spatial imagination plays an important role in the development of materials for construction design. Therefore, a student can do science assignments only if he has a spatial imagination.

The computerization of the education system is a key factor in the formation of students as fully developed intellectual potential for all aspects of life. With the help of computerization of education, events and processes not only in nature and society, but also in the educational process are modeled, managed, studied and diagnosed. In the current context of computerization of all spheres of human activity in society, it is important to ensure a high level of computer literacy of the younger generation.

New information technology in education is the use of computer technology in education. Smirnov A.V. "... new information technologies — processing technology, delivery, computer imaging and dissemination of information, computational and software development."

The subject of "Construction drawing" is the preparation of a working drawing of the building and the construction of the throne. Depending on the history of the project work on this topic, it is necessary to find a solution to its style parts in the form of modern design.

Views of the submitted project work are required to be placed in this order. If a student changes this sequence, the standard requirements are violated. Such assignments can be explained to students in the classroom and given in a variety of ways. For example:

Traditional method: drawing on the board.

Non-traditional method: animated presentation of the sequence of performances.

Modern method: a 3D model of a given detail can be displayed in a virtual view and rotated from different angles. In her research, VV Kondratova gave scientific recommendations on the use of

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computer graphics in the classroom. That is, using computer graphics to model models of details needed for a lesson would be effective.

Modeling is a clear and understandable view of real-world events and processes in a particular field. The following types of modeling can be used in computer science teaching as well as graphic and geometric modeling.

The modeling process involves three elements:

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

Computer modeling - a virtual representation of mathematical and geometric modeling. Computer modeling can be used in many areas. Wide use in all types of electronics, energy, chemical biology, architecture, design, engineering is yielding good results today. In particular, on the subject of "Descriptive Geometry and Engineering Graphics" it is possible to model various drawings, details, models using computer graphics.

Modern computer technology is opening up new possibilities. As a result, complex project work can be quickly resolved. These technologies are also affecting the education system and are widely used in teaching. There are many graphics programs and systems available for construction design, depending on the type of course. These software systems include: MS Word, MS PowerPoint, AutoCAD, Paint.Net, ArchiCAD, ElectroCAD, Adobe PhotoShop, Adobe Flash, CorelDraw, 3dMax, Lumion, Revit, Lira and others. Using these programs in the classroom can provide students with the knowledge and skills they need to learn in a short period of time. When all of these graphics programs are used interconnected, the goal can be achieved much faster.

ArchiCAD has expanded modeling capabilities, making it easy to create building models. The use of images, views, clippings, stairs, roofing, nodes, constructions, estimates, and the like to illuminate topics develops students' spatial imagination and creative thinking skills.

A science teacher can create thematic projects in ArchiCAD and use them in the classroom. Created models can be viewed from different angles using the extensive capabilities of ArchiCAD, cropping, changing the color of the model, automatically resizing, and more.

The main requirement is that the teacher knows computer graphics, that is, he must choose graphics programs according to the content and essence of the material, the level of complexity, didactic tasks.

We are students of construction drawing:

- history of computer graphics;
- computer graphics departments;
- Systems (CAD, CAM, CAE) that make up the design graphics department;
- Graphic programs working in the CAD system and the principles of their operation;
- electronic image formats;
- panels of equipment used for drawing;
- know the algorithms for obtaining a drawing of the object based on its spatial position;

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- Analysis of toolbars for creating two- and three-dimensional graphics;
- draw a two-dimensional drawing of a given three-dimensional detail;
- build a three-dimensional model of the detail based on a two-dimensional drawing;
- to determine the optimal algorithms for designing geometric models in the plane and in space;
- create complex drawings and shapes in the plane and in space;
- Must be able to draw and print a drawing;
- Analysis of complex objects;
- Comparison of manual drawing (using drawing tools) and CAD;
- Comparison of two or more CAD programs;
- Identify similarities and differences between CAD programs;
- We think that they should be able to independently master new CAD programs.

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