

### Modern Electronic Methods of Controlling Students' Knowledge in the Field of Construction Drawing

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**Abstract:** Electronic form of assessment of students' knowledge in the field of construction drawing in higher education.

**Keywords:** construction, independent learning, test, drawing, computer graphics, graphics software, construction drawing.

Resolution of the President of the Republic of Uzbekistan dated June 5, 2018 "On additional measures to improve the quality of education in higher education institutions and ensure their active participation in the ongoing comprehensive reforms in the country" Paragraph 11 of Resolution No. 3775, paragraph 3, provides for the organization of classes based on the introduction of teaching technologies and interactive methods that direct students to innovative thinking, with a focus on independent learning of students. focus on the implementation of legal mechanisms.

Until now, teaching has been a priority in the current education system, but in the information age of society, the priority is to teach reading. For this reason, the teacher-textbook-student paradigm of education needs to be replaced by the student-textbook-teacher paradigm. The modern pedagogical staff has a new position, the task of which should be focused primarily on the organization of independent learning activities of students, the acquisition of knowledge independently and the formation of skills to apply them in practice. For such purposes, the teacher should choose teaching methods and technologies in such a way that students have the ability not only to acquire ready-made knowledge, but also to acquire knowledge independently from various sources, to form their own point of view, to justify it and use acquired knowledge should be.

Although mastering knowledge is an important factor in developing thinking, any acquisition or acquisition of knowledge does not have a developing effect on student thinking. To do this, it is necessary to activate knowledge, forms of activity. Simple repetition of acquired knowledge is not enough to develop students' thinking. Active learning, independent thinking activities are essential. The process of independent acquisition of knowledge and the process of applying the acquired knowledge becomes a source of new knowledge, effective thinking of the student.

According to LN Anisimova, the successful formation of students' professional competencies, graphic training should use computer technology and interactive lectures and an innovative approach based on independent learning.

In the age of advanced technology, computer hardware and technology are widely used in solving complex design tasks, remote control of processes, ie in the creation of automated workplaces, virtual experiments and similar large-scale work. In addition, computer technology is having a positive effect on the educational process. Today, the level of provision of educational institutions with such equipment has risen to the level of world standards. This has led to an increase in the quality of education, the full development of the cadre, the intellectual potential. As a result, it has made it possible to train competitive personnel that meet world standards. The use of computer equipment and technology in the training of such specialists has become the basis for rapid

development. One of the tasks of teachers is to use the integration of computers and new pedagogical technologies in the classroom, thereby increasing the effectiveness of education.

A variety of methods and techniques are used in the teaching of "Construction Drawing" in higher technical education, as well as in engineering. However, observations and research show that this does not produce the desired results. Visual aids, posters, handouts and, in part, computer technology are used to teach construction drawing. Therefore, the graph shows that the education is not effective enough. The best solution is to teach the subject on the basis of full computer technology, and on this basis to ensure a high level of mastery of students.

Sh.Abdurahmanov, Ch.T.Shokirova and others gave scientific recommendations on the use of tests in education.

There are a variety of ways and means to test students' knowledge, including:

Oral question and answer;

Writing - writing and drawing graphic assignments;

Tests include automated and paper, and so on.

The main requirements for computer-based control are:

- validity;
- accuracy;
- simplicity;
- means the same thing;
- reliability.

In determining the validity of the test, it is necessary to distinguish between its content and functionality. Content validity describes the relevance of the test content to the controlled learning material, while functional validity describes the relevance of the test to the level at which the student's performance is assessed.

As you know, automated, that is, computer-based testing is a method of assessment that gives good results. Subject-based tests make it easier to assess students' knowledge. Tests in the field of construction drawing are available today and are used in the educational process. There is a need to create level tests in the field of "Construction Drawing" and apply them directly to the educational process.

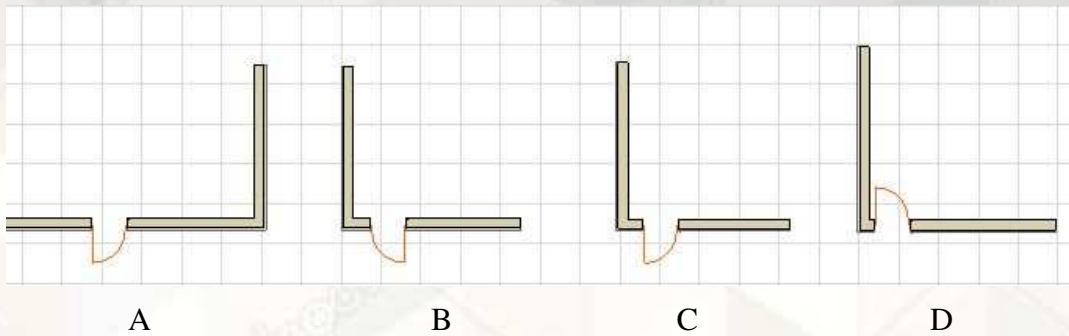
It is advisable to conduct oral questions, written graphic works and tests of different levels together to test students' knowledge and skills.

Tests in Construction Drawing should be designed at the following levels:

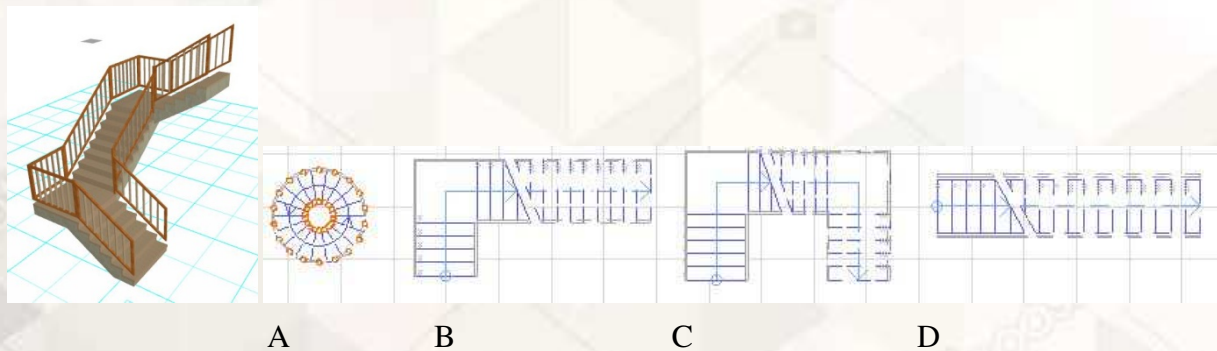
Level 1 test - easy and simple tests on the topics covered in the course. Tests at this level use the student's memory, that is, they have to remember what they saw and the descriptions. Students who pass these tests will be 55-70% in science. For example, what is the thickness of the gap between the floors? Answer - 300 millimeters.

Level 2 test-course is a test of moderate difficulty on the topics covered in the course. Tests at this level involve analyzing and comparing drawings in science. Students who pass these test questions will have a 71-85% mastery of the subject. For example, in which diagram is the door position found by standard? Answer – D





Level 3 test-questions include questions and assignments on in-service and out-of-course independent work. Tests at this level require students to analyze, compare thinking. Students who pass these tests will have a mastery score of 86-100 percent.



Level 4 test - this test is used to determine the ability of the student. In this test, a question is asked and an answer is chosen, and then some of the questions can be answered logically, that is, the answers can be entered into the computer itself. In addition, such tests shape independent thinking as well as creative thinking.

The process of teaching construction drawing requires attention to every factor. To do this, it is necessary to ensure the volume, structure and accuracy of the information that must be provided to students in the process of learning and independent learning. To do this, a science teacher must use the capabilities of modern computer technology, based on today's requirements.

In addition, our e-textbook contains tests on the topics, which include questions that encourage students to think logically, as well as comprehensive knowledge testing.



In formulating the criteria for evaluating the performance of higher education institutions, the main focus is on the index of the quality of teaching and the level of scientific potential in higher education institutions, each of which scores above 35%. One of the key factors in calculating the ranking of professors is their teaching and learning.

Involvement of graduates of technical higher educational institutions and talented youth in the field of innovative developments, technological projects-startups ... "is considered to be a topical issue today. Combining students with modern techniques and technologies in teaching will allow them to think creatively and develop new innovative ideas.

Continuation of the path of further improvement of the system of continuing education in Uzbekistan, highlighted in the Action Strategy for 2017-2021, increasing the capacity of quality educational services, in accordance with the modern needs of the labor market, highly qualified personnel The preparation is a topical issue today.

The educational process is not an exception to these technologies, but with the help of them a variety of experiments, research and scientific solutions.

Animated computer programs and tools of modern computer technology effectively help to develop students' spatial imagination in a short period of time. Experimental testing of these tools has made graphics training more effective. The experimental group was selected and first given on a drawing paper, and one example of this topic was presented in multimedia form. The students then completed their homework based on this example. To date, we have developed multimedia animations of basic topics in the field of "Construction Drawing" and are used in the educational process.

In addition, independent learning is another effective way to assess students' knowledge. Before the advent of computer technology, students were required to write independent assignments by hand.



However, in today's age of technology, the transfer of independent learning in electronic form has proven to be more effective. Electronic self-study is a very effective method, especially for the subject of "Building Drawing".

"Independent learning is a gradual learning activity based on the independent study of an issue or problem with or without the assistance of an expert."

One of the conditions for successful preparation of students for the subject "Construction Drawing" is the organization of their independent learning. The process is designed to help students master and reinforce the learning material. The most important advantage of computer graphics as an intensive technology is that it has the ability to take a flexible and individual approach to the organization of classes in order to demonstrate students' independent creative activity, overcoming stereotypes and inertia of thinking.

According to EG Azimov: "Independent work is an integral part of the educational process, which is carried out by the student without the direct participation of the teacher or guided by the teaching materials created by the teacher. It includes individual work of students by the teacher or according to the instructions given in the textbook.

Approved by the order of the Ministry of Higher and Secondary Special Education of the Republic of Uzbekistan dated August 14, 2009 No 286 "On the organization of independent work of students" According to the "Guidelines", the student's independent work is a systematic activity aimed at the acquisition by a student of a certain part of the knowledge, skills and competencies identified in the curriculum of a particular subject on the advice and recommendations of the science teacher.

In view of the above, since independent learning is an activity, independent work can also be considered a type of activity. We believe that the proper organization and control of students' independent learning is an effective means of achieving the goals of the discipline. Because today, half of the time allocated to each subject is devoted to independent study.

In Europe, the United States, and Japan, for example, students spend 50 to 60 percent of their time studying independently.

I. Kovalevsky distinguishes two types of independent work:

- Classroom work (independent work is carried out in the classroom under the direct supervision of the teacher and on his behalf);
- Extracurricular activities (independent work is carried out on behalf of the teacher, but without his direct participation).

In his research, S. Kulmatov divides independent work into three types:

- 1) performance of the task without the participation of the teacher;
- 2) require students to understand the objectives of the curriculum as a result of independent research;
- 3) students are not limited in time to complete the work, choosing the methods and content of the task.

Based on the above information, it is possible to give an idea of the essence of independent work of students in the field of computer engineering and their organization. One of the most common forms of organizing independent work of students from the disciplines of engineering graphics can be cited individual graphic tasks. Materials on their implementation are provided in the relevant instructions.

Of course, in this process, students can seek help from a third party (other students). However, the task of checking their independent work remains under the control of the teacher. Today, it is common for engineering computer graphics students to re-assign tasks in drawing to perform in the traditional way. In this case, the assignment of the graphic task and the final result remain the same. Only two different drawing tools are used to perform the graphic task.

Take, for example, the graphical task “Proper execution of door and frame positions in the design work” (Figure 1).



(Figure 1).

Assigning a graphic task in this way helps to serve both subjects equally. Of course, in the science of construction design, the idea arises that the building itself can be presented in its original form. However, given that the graphic tasks given to students are updated and improved every year, it takes a lot of time and material to build a building depending on the type of service. Therefore, assignments are usually given in the form of illustrated images. This does not explain the possibilities of graphics programs in engineering computer graphics. However, this graphic task is given to students in the form of a three-dimensional electronic model in the field of engineering computer graphics, which allows students to increase their interest in science and to expand the possibilities of graphics programs (Figure 2).





(Figure 2). A clear view of the building created in the ArchiCAD graphics program

"Knowledge is the proven result of knowing reality, its correct reflection in human thought" - the knowledge accumulated by ancestors until recently, through reading and listening, gradually and continuously perceiving from the first word to the end accepted. This form of human knowledge transfer has established a linear approach to curriculum development. The data is presented in hierarchical and linear form, the final result is always predetermined.

Traditional tools and technologies in education are often linear. Examples include textbooks, manuals, and instructional computer programs. All this is based on the transfer of ready-made knowledge on the principle of membership.

There are many other ways to organize independent learning that we have analyzed above and can be incorporated into the linear approach. That is, the teacher expects the student to have a clear, predetermined outcome. "Linear perception of knowledge has influenced the structure and organization of training. According to the curriculum, students move from week to week, year to year, along a single possible path, and at the end of their journey, they reach a single final goal. "

This negatively affects the student's free creative thinking. According to L.V. Redin, the main reason for the difficulty in cultivating a creative thinking person is the lack of direct clarity in the concept of "creativity" in the works of various authors and the lack of conditions for identifying, strengthening and developing creative abilities. However, modern psychology asserts that everyone is born with creative abilities. Society strives for the quantitative indicators of material production and for the suppression of personal qualities such as human fantasy, imagination, the pursuit of the supernatural and the irrational.

The research conducted by LV Pavlova is based on the use of computer graphics in the teaching of technical graphics and computer graphics, as well as the development of creative activity of students using the program AutoCAD. He says:

"Involving students in creative activities and using effective teaching methods and techniques is the best way to find the inner resources of the student's learning process. On this basis, we can talk about intensifying the educational process. "

The development of students' independent thinking can be divided into 4 levels:

The first level is the simplest level of independent thinking. In this case, the student performs the assigned task according to the rules and patterns;

The second level is variable independent thinking. It is the ability to choose one of several rules and definitions and use them in the task at hand;

The third level is partially searchable. It demonstrates the student's ability to formulate generalized solutions to a wider range of problems based on existing laws and regulations;

The fourth level is creative.

Developmental, research-oriented areas of education (active learning methods) build learning technologies on learning methods rather than on the transfer of ready-made knowledge. In other words, a nonlinear knowledge model influences the formation of a student's personal model.

We consider it expedient to organize independent education in this way. Students' independent assignments in science should be structured in such a way as to encourage them to think creatively during the assignment.

Non-linear learning technologies include the following types of learning methods: project method, use of computer as a learning tool, computer modeling, laboratory practice, demonstration method, hypermedia systems work with.

According to Henn, nonlinear structures have become widely used in information technology. Based on their principle, contextual reference systems (Help) are built in computer programs, which allow the student to acquire independent knowledge on the individual educational trajectory. High efficiency can be achieved by mastering graphics programs using the Help system. This system allows you to use a computer as a learning tool.

D.H. Jonassen describes cognitive tools as follows: "Cognitive tools are devices that expand, support, direct, and perform the thinking processes of their users. They are tools for building and mastering knowledge and can be used to study any science" In his view, computer applications as a means of learning provide an opportunity to impart more solid knowledge to students.

With this in mind, engineering can be used as a learning tool in computer graphics:

- graphics systems that allow modeling of images on the one hand, and on the other hand, which are often hypermedia textbooks;
- Demonstration and modeling programs that allow to generalize the accumulated experience and generate knowledge;
- databases that allow you to summarize and formalize the collected knowledge, perform quick searches and filter data;

spreadsheets that simplify the computational process, allowing rapid graphical representation and modeling of intermediate data.

According to leading scholars, the essence of higher education is characterized by independent scientific work. Each student must master an effective method of scientific work, develop the ability and readiness for independent creative activity, the ability to independently acquire and improve scientific knowledge and the ability to apply it creatively in practice. Continuous improvement of scientific activity and education should become a personal need of every highly educated specialist. The goal is to introduce students to the rules and techniques of successful creative activity from the first year of study.



GV Glotova notes that over the past decade, ideas about the role of teachers, as well as forms of cooperation between teachers and students, have expanded. There are three main functions of university teachers today: teaching, research supervisor, and consultant. The high productivity of students' research work is due to the positive development of the relationship between teacher and student, their cooperation. At the same time, there is a growing trend in the education system to strengthen the role of the teacher as a supervisor and advisor.

In agreement with GV Glotova, we consider it expedient to direct the process of independent study of students in the field of engineering computer graphics to independent research.

Prospective professionals will find ways to independently address the challenges they may face in their work. In addition, students will be able to work independently and conduct independent research after graduation.

Based on the above information, the organization of independent learning on the basis of research-oriented (non-linear) technology, rather than linear, provides a basis for a creative approach of the student to the task.

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