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DIDACTIC FOUNDATIONS OF PROFESSIONAL TRAINING OF FUTURE ENGINEERS BASED ON GRAPHIC INFORMATION

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ABSTRACT

Engineering and computer graphics should be thoroughly studied by future engineers, this is the demand of the time. Every new idea put forward in engineering creativity was previously "baked" in drawings made by hand, using drawing tools, but now it is necessary to do such work on a computer. Drawings made on a computer have a number of advantages in terms of their quality, accuracy and ease of application to the production process. But creating drawings with such qualities requires the designer to master computer graphics perfectly. In our research, we strive to provide educational materials in the form of a matrix exercise system, which consists of traditional exercises, but combined into a two-dimensional scheme. The correspondence between the content and spatial relations of equal knowledge of the elements of the matrix includes the nature of interaction, as a result of which the systematic quality or regularity of systematic knowledge is ensured.

Keywords: information and communication technologies; software; practical experience; educational process; drawing lessons; development of creative abilities.

INTRODUCTION

It's not a secret, except for some higher education institutions in our republic, in many places neither the teaching of this subject nor its mastery by students is up to the current requirements. Training future engineers and technologists in computer graphics at the level of modern requirements requires the fulfillment of certain conditions. The following can be specified as such requirements:

1) the computer graphics teacher should have high skills in computer graphics;
2) rooms where computer graphics training sessions are held should be equipped with a sufficient number of computers and each of them should be loaded with three to four types of the latest graphic editing programs;
3) the methodology of teaching computer graphics is carefully developed and this methodology is well mastered by the teacher of this subject;
4) availability of good textbooks and training manuals and methodical instructions on computer graphics;
5) that students have sufficient computer graphics propaedeutics (primary knowledge, skills and abilities that serve as a basis for learning a new subject) and that k. s.

Within one block, the execution of separate tasks can be transferred to one or more changes (often this is a training pair), depending on whether the tasks are performed simultaneously. Here it is important to note the following: if, based on the systematic principle, exercises are located in the form of a linearly defined "chain", then compliance with the systematic principle includes exercises in some integrated blocks that are considered to exist at the same time. The

spatial structure of the matrix (top and bottom symmetry, right and left, center or diagonal symmetry) has its own "integrated" properties. Logical-didactic features of learning matrices include logical categories of events, features and relationships. It is convenient to imagine the relationship between them in the form of two parametric formulas. A straightforward solution to this problem is to represent the relevant quantities in the cells of the matrix; this process is based on the opposition of signs: visible - invisible lines (objects), dotted lines (projections), front view - top view. In this paragraph, we will consider the main didactic function of tasks.

METHODS AND MATERIALS

Generally, a student must complete the same type of tasks to learn each section of a subject. It takes less time to complete the projective drawing task in the second semester, because such a process is learned in drawing geometry classes and is memorized during repetition. One of the less used means of science development is the presentation of knowledge in the form of a matrix (table). The task schedule increases the time to develop additional systematic (non-numerical) information "in an undefined way" (within the task itself!). The main role in modern didactics is to increase knowledge at several levels at the same time. Learning methods such as moving from a verbal rule to an appropriate drawing are effective because here one learning method (reception) supports the task.

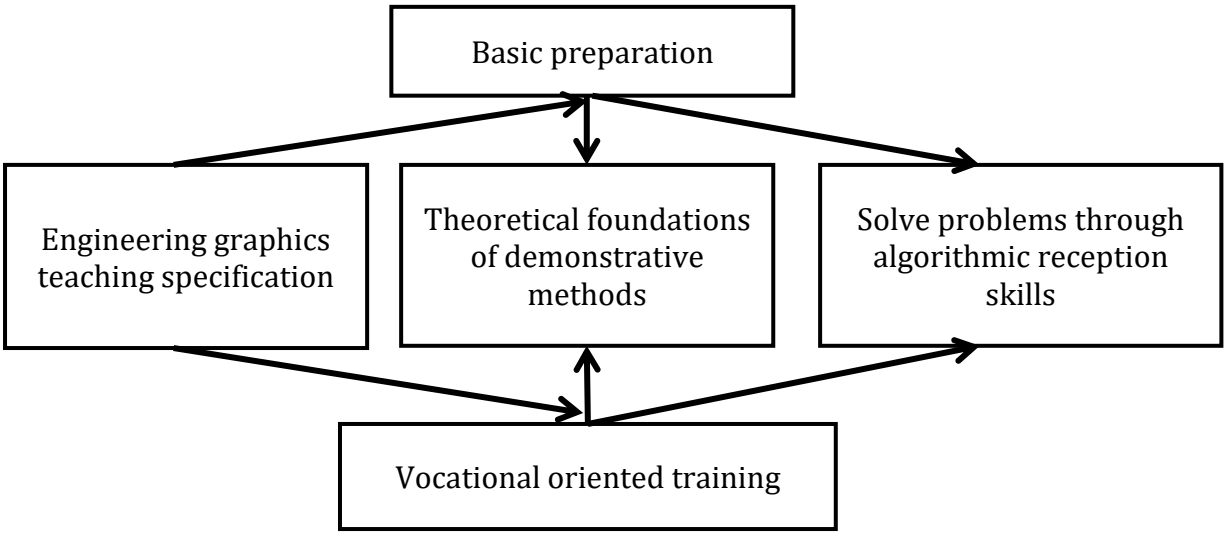

Figure 2.1. Basic training of future specialists

Training of future engineers in engineering and computer graphics is a specialty. It not only provides adequate basic education, but also creates a professional and pedagogical burden (Figure 2.1). At the same time, basic training includes two main components:

- formation of knowledge about various methods of images and their theoretical foundations;
- the ability to use methods to solve various problems.

The professional focus of engineering and computer graphics research has an impact on both components.

The future specialist should have the following skills:

- knowledge of image methods that can be used in professional activities;
- the ability to choose the most appropriate method in a specific situation;
- the ability to use drawings in the conditions of production activities.

The specific nature of teaching engineering and computer graphics in a higher educational institution leads to the need to consider questions from the point of view of school geometry, the studied methods are used to describe space objects and combinations encountered in practice.
Another feature that should be taken into account when organizing classes in engineering and computer graphics is related to its uniqueness. This includes, in particular, the development of methods for creating their images, considering the methods of graphically solving problems with numbers using a two-dimensional image, studying the geometric properties of objects in their images. Therefore, in the process of teaching engineering graphics, it is necessary for students to distinguish, differentiate and compare the properties of objects. Teaching should reflect the interdependence of two-dimensional and three-dimensional objects. This, in turn, requires the need to jointly study the images of flat and spatial forms, to solve the corresponding problems. The basis for such studies is created by a simple similarity to the properties of flat and spatial objects and the uniqueness of the design of technical parts and mechanisms in the engineering graph. The specificity of the content leads to the specific characteristics of its generalization. This requires the definition of the specific content of the technique, the isolated set. In the teaching of engineering and computer graphics, we determine its essence and role, its impact on the mastery of one or more sections of educational materials in the formation of a holistic view of the topic of study and general methods of solving problems related to it.
In the teaching of engineering and computer graphics, the main functional loading is carried out in order to implement a comprehensive approach to the learning materials of the joint study and simultaneous reception of the relevant units of the content. This method, in accordance with the specifics of the content of the subject, includes the use of several algorithms to create an image of a geometric object in one lesson.

RESULTS

Thus, the CDU process in the study of image theory provides an exploration of different image modalities traditionally seen in linear sequences. At the same time, the temporal convergence of image methods means observing the principle of minimum time interval when studying the components of the object, which helps to form strong connections in short-term memory. As a basis for understanding and remembering the studied material, such connections are transferred to long-term memory. A long time interval does not form a strong association in short-term memory. That is, the total time interval between the study of the relevant components should be minimal in order to quickly and firmly generalize the methodological connections in the educational materials. Volumetric information of spatial compounds is easily implemented. Temporal and spatial convergence of the image method can be done by considering them on the basis of a single model.
As a CDU adoption in the study of engineering and computer graphics, we consider the simultaneous application of several image algorithms of this object. Such a method allows to form the competence of students in the process of comparative analysis of several methods used in the same task, the ability to find the correct location of the object in relation to the projection plane, and to choose the image method that is most suitable for the purposes of using the drawing. The development of important relationships and relationships that students are learning at the same time makes it possible to consider some issues based on school geometry.

Basic problem solving methods of Engineering and computer graphics should be used in laboratory sessions. When choosing the content of lectures and laboratory sessions, it is necessary to refer to the textbooks when describing the established rules of drawing theory. A comprehensive presentation of the topic, showing different ways of introducing the same concept, solving the task, and justifying the confirmation will help to master the science of engineering and computer graphics in depth. In addition, the method considered by DBB in the study of image methods helps to implement the professional direction of education, because it allows the future engineer to show how the studied material is related to the phenomena and processes that should be used in his further professional activities. The process of combining didactic units includes the activation of students' learning activities. The generalization of the material is effective in terms of content, and it is better if it is not mechanistically studied, but is produced in independent studies. Independently obtaining new results in the educational process is primarily characterized by the extensive use of logical and technical analogies. The analysis of teaching practice shows that usually the teacher does not allow students to answer questions. This reflects the fact that the educational activity of students is mainly only reproductive (errors in such activity are unacceptable, it must be repeated correctly). Mistakes are inevitable in productive, creative work. This type of error is proven by analogy. In finding the correct answers, it is important that students find the fallacy of propositions that arise in the process.

CONCLUSION

This approach to the presentation of the image theory allows many students to independently isolate the most important units of educational materials and establish important connections between them, to consider the same material from different angles (in particular, to consider the studied material from the point of view of its application to the school geometry course), the studied part of the educational material one or more structure determination is performed. This, in turn, depends on the surface elements of the real material, which complicates the process of forming an integrated opinion about the subject of study. In addition, psychological research has shown that the more material and the more independent parts it contains, the faster it is forgotten. On the contrary, increasing the amount of information and improving the quality of assimilation by students, as well as the duration of memory retention, can be achieved by summarizing the educational material, combining its small parts into large ones, and giving a certain structure that can be implemented on the basis of CDU.

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