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METHODOLOGICAL FOUNDATIONS OF USING AUTOMATED TRAINING PROGRAMS IN DRAFTING

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Abstract: The article discusses the automation of teaching in the field of drafting using Automated Training Programs (ATP). It highlights the role of the cybernetic approach in managing the learning process and the principles of ATP, including information assimilation control and student self-assessment. Special attention is given to the use of graphic software, such as AutoCAD, in educational activities to enhance learning efficiency and individualization.

Keywords: Automation, ATP, drafting, learning process, cybernetics, graphic software

At present, automation is becoming increasingly necessary and widely adopted in various fields of activity. In particular, the automation of the design of control tools and systems is one of the most urgent issues of our time. Owing to the use of computer software and specialized technologies, the development of complex control systems has become a far more efficient, accurate, and convenient process than before.

In Uzbekistan, however, automated instructional programs used in technical drawing with the help of computer technologies have not yet been sufficiently developed. For this reason, it is important to consider the types of automated teaching programs and the methods of applying them effectively in the educational process. Such programs can play a significant role in modernizing the teaching of technical drawing and in improving the quality of students' graphical knowledge and practical skills.

Automated teaching programs are generally based on the idea that education should be viewed as a complex dynamic system. At the core of this system lies a cybernetic approach, according to which the teaching and learning process is managed through continuous interaction, feedback, and control. In this context, the teacher transmits instructions to the learner with the help of a computer and other audio-visual technical devices, while the learner responds to these instructions, thereby establishing an interactive dialogue between teacher and student. In other words, the educational process is monitored simultaneously by both the teacher, through assessment and supervision, and the student, through self-assessment and self-correction.

Automated teaching programs are built on several important principles. First, information is presented in small and manageable portions. Second, each portion of information is followed by control tasks that make it possible to check how well the learner has understood and mastered the material. Third, the learner is given opportunities for self-control through questions and exercises. Fourth, depending on whether the response is correct or incorrect, the system provides guidance, feedback, and further instruction. Such a structure ensures that learning is gradual, systematic, and responsive to the individual learner's progress.

In practice, teachers should have the opportunity to choose between linear and branching types of automated teaching programs, or to combine both forms depending on the educational objective. A linear program presents learning material step by step in a fixed sequence, which is useful for the gradual mastery of basic concepts and operations. A branching program, on the

other hand, allows students to move along different pathways depending on the correctness of their responses, thus making the learning process more flexible and adaptive. The combined use of these two types can increase the effectiveness of instruction and make it possible to take into account individual differences among learners.

For the effective use of computers in technical drawing lessons, several pedagogical requirements must be met. First, students should already possess basic computer literacy and practical skills for working with digital devices. Second, before beginning computer-based drawing tasks, they must have acquired at least the foundations of projection literacy, since graphical software is only effective when learners understand the theoretical basis of technical representation. Third, technical drawing lessons should not be transformed entirely into computer graphics lessons. These are related but distinct areas, and it is essential not to confuse them. Computer tools should support and enrich the study of technical drawing, not replace its fundamental theoretical and methodological principles.

If we consider the methodological issues related to producing drawings within graphic software environments, it becomes clear that modern education has access to a wide range of computer-aided design systems. Today, numerous graphic systems for preparing drawings and three-dimensional models—such as AutoCAD, TopCAD, JCAD, 3D-GRAF, KD-Master, KOMPAS-Graphic, and VARIKON—are widely used in scientific and engineering activities. Among them, AutoCAD has become the most popular in the educational sphere. Moreover, both in Uzbekistan and abroad, AutoCAD has become established as a standardized system for automating design and drafting work in many enterprises, institutions, and project organizations.

The growing popularity of AutoCAD can be explained by its accessibility, broad functional capabilities, and applicability to both educational and professional contexts. It allows users to construct precise technical drawings, edit them efficiently, and create two-dimensional as well as three-dimensional graphic models. Because of these features, it is particularly useful in teaching students how to perform technical and engineering graphics in accordance with modern industrial requirements. Through such software, learners can better understand the relationship between theoretical drawing rules and their practical implementation in a digital environment.

The appropriate use of automated teaching programs in technical drawing lessons contributes significantly to the individualization of instruction. It enables students to learn at their own pace, repeat difficult material when necessary, and receive immediate feedback on their work. This helps them to master learning materials more thoroughly and also accelerates the educational process. Students who use such systems often become more active participants in learning, as they are required not only to observe but also to perform, analyze, and correct graphic operations independently.

At the same time, it should be emphasized that automated teaching programs can never fully replace the teacher in the educational process. Independent learning, even when supported by advanced computer technologies, cannot serve as the only or universal method of acquiring knowledge. The teacher remains indispensable as an organizer of learning, a guide in the understanding of complex concepts, a motivator, and a source of pedagogical support. In technical drawing in particular, where students often face difficulties related to spatial imagination, projection principles, and graphical accuracy, the teacher's explanations, demonstrations, and methodological guidance are essential.

Therefore, the introduction of automated teaching programs into technical drawing lessons should be understood not as a substitution for traditional teaching, but as a powerful supplementary means of instruction. When used appropriately, such technologies strengthen the

educational process, improve the quality of graphical training, and help prepare students for the demands of contemporary engineering, design, and production environments. In this sense, the integration of computer technologies into technical drawing education is both a pedagogical necessity and a strategic direction for the future development of modern education.

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