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INTELLIGENT COMPUTER SYSTEMS AS A TECHNOLOGY FOR DEVELOPMENT OF STUDENTS' CREATIVITY

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Abstract

The modern stage of the higher education transformation is characterized by research and implementation activities of pedagogical technologies allowing one to ensure quality formation ofgeneral culture and professional competencies of the future specialists. Effective resolution of challenges facing scientific and technical spheres largely depends on the quality training of students, on their ability to use information and communicative, intellectual potential of these techniques. This article examines the didactic readiness of the higher school educators to use innovative computer technologies in the educational process. Data obtained from the study prove that the content of professional development programs for postgraduate and additional professional education listeners should be updated concerning didactic issues of application of intelligent computer systems (ICS) in educational process. The paper emphasizes that modern ICSs allow one to incorporate considerable changes into the practice of educational process realization in the higher educational institutions. An activity of the educator is guided to create conditions for formation of professionally significant competences of students capable using ICSs to create various reality models. The educational landmark now is not a simple acquisition and even not possession of knowledge, but formation of capability in self-organization of educational, scientific, professional activities, livelihoods, ability for acquisition and development of general cultural and professional competences. The task of a teacher is to train students to operate in conditions close to real life situations requiring extraordinary approach, ability to navigate and make right decisions in non-standard situations, in uncertainty conditions.

Keywords: Intelligent computer systems, pedagogical process, creativity

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1. Introduction

The world is improving every day. Facing something unknown, seeking to discover or create something scientists, researchers, inventors find themselves in uncertainty conditions. Any creative process implies the presence of search for truth process by trial and error way, the so called 'torments of creativity', then comes the 'illumination' and then starts the painstaking work on capture and pinning of the obtained data, development of the idea. Probably, with a view to every person in every sphere of activity to have opportunity of creative realization, a systematic work is required to develop with him the certain personality traits, allowing one to see, detect and develop something previously unknown, but interesting and useful.

At all times a progressive pedagogical community was seeking for usage of innovative technologies in its activities (Kodzhaspirova, 2021). Nowadays personal computers equipped with various artificial intelligence systems have become such sort of assistants. Artificial intelligence as a term itself was proposed by John McCarthy information specialist in 1955 (Pickover, 2021). Throughout the history of mankind, people have been interested in secrets of the mind, the nature of thinking, the ability to create artificial creatures with perfect intelligence, machines with reasonable behavior. In the present article artificial intelligence is all means invented by human being to facilitate and intensify his own intellectual activity.

We are describing pedagogical experience of teaching engineering disciplines to students of technical specialties on the basis of computer-aided design systems designed for the interaction of man and machine in technical creativity. Computer-aided design systems are designed for specialized solutions for the design of products shape, the creation of control programs for their processing on machines with digital-program control, precision control and reverse engineering.

2. Problem Statement

Currently, the formation of a close connection between the development of society and information-communication technologies is being traced. Engineering education is also an object of informatization.

The constantly growing requirements for the level training of students – future engineers dictate the need to find new approaches to organization of educational process at the higher technical school (Bulanova-Toporkova, 2006). One of such approaches in the modern educational system is a technological approach, the method of implementation of which is the use of intelligent computer systems (ICS).

First of all, in the process of training future engineers should work with quantitatively defined mathematical and computer models of the objects being studied, on the laws of natural science and mathematical disciplines. Secondly, in the vast majority of cases, they have to operate with 3D objects and corresponding geometric models, including their computer representation. Thirdly, training of an engineer involves performing of practical and laboratory works on actual often very expensive equipment including automation and informatization tools.

The higher technical school is constantly in the process of providing and updating of material and technical base with computer equipment. Operability, accuracy, reliability of information transmission and processing in engineering education make the education process more efficient.

But at the initial stage of mastering of ICS students need great volitional and intellectual efforts. Without pedagogical support from the teacher, as experience shows, no more than 10% of students can

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master new unknown computer tools at sufficiently professional level. Therefore, in order for all groups of students to cope with curriculum, it is necessary to develop appropriate pedagogical technologies for mastering the ICS.

3. Research Questions

The object of our research is the pedagogical process of teaching students the discipline 'Engineering and computer graphics'. The subject of the research was technology of formation of creative abilities of students in the study of discipline 'Engineering and computer graphics' implemented in the process of preparing of student scientific-research papers on the basis of ICSs.

3.1. To identify the set of competencies necessary for students to carry out creative activities on the basis of ICS.

3.2. To develop and implement pedagogical technology for formation of students' ability to implement creative projects in the process of mastering of ICS.

4. Purpose of the Study

The purpose of this study is theoretical and methodological justification and practical testing of technology of forming of students' creative abilities in the process of studying the course of engineering and computer graphics, and their implementation in research activities.

5. Research Methods

The content illustrates the results of the study of the stated problem on a sample of teachers who have significant work experience in higher technical school and experience in scientific and research training of students. The used research materials were individual creative projects of students carried out in the process of extracurricular contact (remote) with the teachers and contactless activities, scientific reports of students at scientific and technical conferences, participation in international competitions. In the course of research, empirical data on the pedagogical process was collected using ICS. Information from practice of teachers' work was analyzed and summarized: information on the results of training, on the methods and means to organize the pedagogical process, on the use of pedagogical technological innovations, reports of departments on research work done with students.

The main problem of students' creative development in ICS is the creation of new teaching methods and technologies. At the same time, it should be taken into account that students in the learning process from passive recipients of information become active participants: in the learning process they create their own understanding of the subject content, use a creative approach to solving tasks and have the opportunity to work with scientific material.

An innovative teaching model is based on the following provisions:

- students are in the center of teaching technology;
- cooperation is at the heart of the training activity;

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- students play an active role in learning;

- the essence of the technology is development of creative abilities to solve scientific and technical problems on the basis of ICS.

In modern pedagogical activity three relatively separate types of training are used. They differ in a number of features:

- explanatory and illustrative (translational);

- a computerized teaching programmed and developed on its basis allows one to make the teaching process a technologic alone;

- problem – heuristic, which allows one to act in situation of uncertainty with application of ICS.

Various combinations of these types are also widely used which makes the teaching process combined and flexible.

Experience shows that such methodological findings, combined with properly selected computer training programs, allow us to intensify teaching process without compromising the quality of mastering of educational materials, as well as make educational process creative. Exactly the latest property – creativity in the educational process is accepted as the main argument in favor of creating a computerized learning environment for learning of various disciplines, in particular engineering and computer graphics.

For design of the educational process based on ICS, it is necessary to introduce into the educational process teaching methods that are focused not on knowledge, but on an activity approach.

Implementing the activity approach includes *problem-activity training* (students are consistently posed with problems solving which they learn not only the knowledge component of future scientific and professional activities, but also the skill of its implementation). There is also *modular training* (students independently work according to an individual curriculum in the form of a completed content module); *contextual training* (modeling the subject and social content of future professional activities); *methods of active education* (independent cognitive activity aimed at searching, processing, assimilation of educational information).

Active teaching methods involve the use of such system of methods, which is mainly aimed not at the presentation of ready-made knowledge by the teacher and their reproduction, but at the independent mastering of knowledge by students in the process of active cognitive activity. Among the active teaching methods there are: *non-simulation methods* (problem lecture, roundtable, conference lectures, programmed training, field classes with thematic discussion, Olympiads, heuristic conversation, practical group and individual exercises, scientific conferences). There are also *non-game simulation methods* (situational solutions, solutions of individual problems, discussion of developed options, competition of practical works with discussion, case method, modeling of production processes, discussion of special videos) *and game simulation methods* (brain attack, business game, role-playing game, game design, round table, discussion) (Lavrentyev, 2002; Panina & Vavilova, 2006).

Computer training equipped with special training programs can be effectively used to solve almost all didactic tasks – providing of information, managing the teaching process, monitoring and correcting of results, performing training exercises, accumulating of data on development of the educational process, etc. (Galikhanov & Khasanova, 2019; Verbitsky, 2019).

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6. Findings

Usage of ICS in the process of formation of creative abilities of students during the study of discipline 'Engineering and computer graphics' allows transition from the reproductive to productive type of activity of more than 80% of students, and from productive to creative type of more than 50% of students. Intensive usage of ICS allows the teacher to quickly choose tasks that develop students' creative abilities, increasing their motivation, developing intelligence and enriching experience.

7. Conclusion

The carried out work allows us to make conclusion that ICS is an effective technological tool that allows an experienced teacher to improve significantly students' academic performance, promotes the development of their creative abilities, giving experience of work in situation of uncertainty, choosing an algorithm for solving problems in non-standard situations. Thereby it prepares them for real life situations when there is no pre-planned algorithm for making a decision, allows them to feel like a pioneer, instills interest in inventive activity.

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