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DIDACTIC PROVISION OF THE IMPLEMENTATION OF THE TEACHING MODEL OF INFORMATION TECHNOLOGY IN TECHNICAL SYSTEMS IN TECHNICAL SPECIALTIES OF HIGHER EDUCATION ON THE BASIS OF A HIERARCHICAL APPROACH

Ergashev Nuriddin Gayratovich
Karshi Engineering Economics Institute, the Professor of the Department Information Technologies, https://orcid.org/ 0000-0002-8274-6193

Annotation
This article presents didactic support for the implementation of the hierarchical teaching model of the course “Information technologies in technical systems” for students of technical specialties, as well as suggestions for improving the organization of teaching this course in the environment of digital technologies. In addition, higher educational institutions in the field of technology use problem-based, project-based, research, heuristic, and to a lesser extent - information reception in hierarchical training of future engineering personnel in various directions (preparation for hierarchical training). The importance of general didactic methods, such as active and reproductive, is theoretically based.

Keywords: information technologies in technical systems, hierarchical teaching, didactic support, digital education, innovative activity, digital educational environment, etc.

Introduction

In the preparation of students for hierarchical teaching of innovative activities using the possibilities of the digital educational environment, methods are used that give the teacher the position of a doer, innovator, creator, creator of his skills and knowledge and the opportunity to implement his pedagogical project.
The authors of the preparation of professors-teachers for hierarchical teaching in choosing teaching methods are as follows: with the goals and tasks of teaching; teaching principles and methods; course module content; the age and potential of students (the choice of a number of methods is focused on the pedagogical education and the contingent of teachers who have their own experience in teaching); maximum use of opportunities of the digital educational environment in the educational process; they focused on eligibility criteria such

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as the conditions and allocated time provided in the training programs for teaching.

Higher educational institutions in the technical direction used the following in hierarchical training of future engineering personnel in various directions for innovative activities (preparation for hierarchical training): problem-based, project-based, research, heuristic, to a lesser extent - information-receiving and general didactic methods such as reproductive are important.

Analysis of literature on the topic

In addition to general didactic methods, in the system of personnel training for innovative activities using the advantages of the digital educational environment, methods that distinguish teaching in the digital educational environment from traditional didactics are widely used.

Teaching methods are implemented through the interaction of students with educational resources with minimal participation of the teacher and other students.

The use of these methods in teaching in the context of digital technologies is related to the wide didactic possibilities provided by multimedia tools: interactive databases, electronic magazines, computer training programs, electronic textbooks, etc. We will discuss this and other educational tools below with our research work.

It should be noted that the use of these methods and appropriate educational tools is an important component of self-learning in the digital educational environment.

Research Methodology

It consists of methods based on interactive interaction between all participants of the educational process.

The development and implementation of these methods is related to discussions and conferences in educational groups, implementation of joint projects, etc. In this research, the method of pair discussion, which has its own application characteristics in the digital educational environment, is also widely used. The participants of such discussions are separated from other members of the group by a space, they work in comfortable conditions, they have the opportunity to work both online and offline, which significantly expands the audience.

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Study group members discuss the problem in pairs, compromise on the problem, or clarify their perspectives before discussing the problem. A pair discussion is a preparation for a group discussion, and thanks to the pair discussion, the participants develop their independent opinions on the problem under discussion in a more balanced and rational way. Thus, interactive interactions not only between the teacher and the teacher, but also between the students themselves become an important source of knowledge.

Analysis and Results

Individual teaching, learning, and interaction techniques that are also used in teaching in digital learning environments. Individual education methods are implemented through modern means such as psychological-pedagogical support provided to each teacher at all stages of education, Skype, messenger, voice mail, e-mail, e-books.

Methods based on the presentation of educational material to students by a teacher or a teacher without the active participation of the student in communication: lectures recorded on audio or video tapes, read in traditional ways or using Internet technologies. As noted, these methods are a type of network modification of reproductive methods. At the same time, extensive use of multimedia capabilities makes this image of the material qualitatively different from the traditional one.

It is very important that the teaching methods used from the point of view of the systematic approach correspond to its organizational forms.

Traditional forms of learning are used in the digital learning environment: lectures, seminars, consultations, practical exercises, tests, exams, independent work, etc. In addition, in this research work, attention is paid to the joint use of different forms of education in each lesson, and such approaches are justified from the point of view of pedagogical goals.

The special technology of presenting educational material is discrete lectures, and the technology of its preparation, organization and transfer was developed by the author at the distance education base of the Institute of Engineering Economics of Karshi.

The study and analysis of the specific features of the presentation of the educational material in the distance education system provides an opportunity to develop an interactive lecture structure. In the distance education system, the

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lecture is divided into discrete - logically completed parts, which have an interactive description according to the type of "man-machine-man" interaction. Technologically, the lecture material is divided into logically completed parts, each of which ends with 1-2 test questions on the content of the discrete. It is recommended to expand by recommending internal links to external sources that complement and deepen the content within single slides. Answers are checked automatically, and based on the results of working with the lecture, the student will have the opportunity to collect certain points.

This teaching technology implements one of the main ideas of improving the target qualification of the teacher and combining theory with practice - presenting actual research topics and materials - preparation of discrete lectures at the command of the teacher. The peculiarity of hierarchical teaching is that the teacher chooses the forms of the lesson, determines them based on the logic of the content of the program and educational material.

According to the developed technology for the organization and holding of the forum-seminar, the specific characteristics of the interaction of the participants in mutual cooperation are determined.

1. The subject of the lesson discussed in the forum will be announced by the teacher. All discussions take place within a structured topic. Teachers themselves can suggest ways to discuss the problem within the proposed topic.
2. It is recommended to limit the duration of the topic discussion. The unit of time is usually a day. If necessary, the student can return to the topic discussed (for example, if he has comments or questions).
3. The teacher announces the introduction of the topic under consideration, defines the general goal and the approaches used to achieve it. In addition, the teacher publishes information for students: what to read from the educational materials, what tasks to perform.
4. During the discussion of the topic, the teacher initiates questions, concludes, that is, leads the discussion (a student appointed by the teacher can also act as a moderator). The student participating in the seminar, firstly, proposes to solve the problem himself, and secondly, forms his attitude to the point of view of other participants of the seminar, and the teacher or moderator, in turn, directs the course of the seminar and how the discussion is carried out.

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5. The most important rule of participation in seminars is to acquaint students with all materials and statements printed on the shell before expressing their opinions.
6. Under the terms of such workshops, it would be appropriate for both the instructor and students to "view" the forum regularly at least twice a day (eg, every morning and every evening) and participate in extended discussion.

Video conference is a form of network pedagogical audiovisual interaction of all participants of the pedagogical process through network audio-video technologies. Video conferencing helps to bring mediated communication to a live, direct approach and therefore increases the effectiveness of teacher-learner interaction [349]. Video conferencing is one of the effective organizational forms of education in the digital educational environment. Pedagogical communication in the video conference mode is clearly structured, methodically prepared for the optimal use of the opportunities of the digital educational environment, and effective from the point of view of didactic goals.

Electronic textbooks in hypertext and multimedia versions and computer training systems, audio educational information materials, video educational information materials, remote laboratory workshops, electronic libraries, etc. were used as didactic tools in the system of preparing students for innovative activities.

When preparing students for hierarchical training in innovative activities, we pay attention to the principle of maximum use of the innovative possibilities of the digital education system in the pedagogical process.

The need for a scientific approach to their development was also taken into account when creating electronic courses, electronic textbooks, training manuals, and online training manuals. In particular, a theoretical understanding of the use of new educational tools is carried out at the stage of preparatory work for the publication of a textbook or study guide. Therefore, the development of electronic learning resources is an important current problem that requires more time than the creation of a traditional textbook or training manual.

In addition to the theoretical understanding of the essence and content of the electronic textbook, the task of its development is complicated by the need to study in detail the actions of the teacher and the student in the digital educational environment. Such a process includes the collective work of a group of developers, such as the author of the course (content side), a methodologist

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familiar with the peculiarities of the distance learning process, a programmer, a designer.

It should be noted that each educational tool used in the educational environment has its own "strong" and "weak" technological aspects, therefore, in this research, we focus on the balanced use of technical tools or educational environments. the balance (print, audio, computer and electronic) was mainly focused on the principle of pedagogical expediency.

In the system of preparing students for innovative activities, the concept was followed that the change of traditional training manuals to innovative tools should be carried out on the basis of a systematic, anthropocentric and methodical approach. The conducted studies provide an opportunity to emphasize that teaching in the digital educational environment reflects all the following components characteristic of the educational process: goals, content, methods, organizational forms, training manuals. At the same time, each of the components reflects the specific characteristics of learning in a digital learning environment. In this research work, we focused on the following imperative: that is, it is important to find such a combination of variable components and invariants of pedagogical training in the system of continuous education, their integral connection to the practice of information technology for each specific teacher in the field of modern education. provides continuous professional development of implementation.

It is appropriate to imagine the technology of working on scientific research in the conditions of digital education using digital tools.

In our research, the leading features of technology in the context of digital education are:

- repetition of the educational process in the context of expanding the capabilities of digital tools;
- rational selection of digital tools, effective tools for organizing communication;
- qualitative assessment of the results of research activities;
- openness and benevolence of the debate to be carried out;
– quick (operational) feedback;
- it is emphasized that it consists of digital traces as a result of the educational process.

At the planning stage, the subject of communication between the teacher and the student is determined, the goal is estimated, communication methods are

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determined, the content of the educational process is developed, specific directions are estimated. Training is carried out at the stage of organizing the educational process. At the control stage, mutual evaluation, current and final control is organized.

Qualitative evaluation of educational results includes:

- identification of skills formed in the process of teaching to work in a multitasking situation (listening to the speaker);
- recording other people's thoughts, comments, ideas, questions, answers to questions, including your own comments on the speech and comments of fellow students;
- to think over questions to the speaker, ask them and determine the content of the process of discussing the given questions, including one's own questions;
- to determine the skill of "assigning" knowledge according to scientific research methodology;
- determining the level of formation of special and instrumental competencies;
- it helps to determine the possibilities of presenting the results of one's work (presenting a scientific report in public) and to carry out debates and to independently work on mistakes and to implement one's own opinions in the given format.

Learning outcomes:

- formation (improvement) to a certain extent (conducting scientific research, developing research apparatus, justifying the relevance of the topic, etc.): analytical capabilities; skills (asking questions; briefly expressing one's opinion; presenting completed work; carrying out a debate on independently expressed opinions; working cooperatively on mistakes); situations of multitasking (listening to the speaker, making personal comments on the speech and comments of peers; thinking of questions to the speaker, asking them questions and correcting the "question-and-answer"); consider public presentation skills;

Digital tools: effective use of forums, webinars, distance learning tools, private messaging system, e-mail, messenger, Skype, etc. are taken into account.

Forms of communication: individual (personal messaging system, personal messenger, e-mail, electronic library, electronic resources, etc.), group (seminar, webinar, forum, practice, seminar, etc.), collective (open discussion).

One of the factors affecting the effectiveness of the organized educational process is the preparation of tasks for the electronic training course. In the

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context of digital education, the curriculum for teachers helps to create a larger amount of tasks of a different quality (quantitatively) than the traditional format, which is not (arbitrarily) limited by time limits. In addition, each task can be a component of the next one. In this way, it is possible to form a "connected task". This type of task allows to optimize the work of the teacher, because it is possible to carry out final control, including all the previous ones, in the stages of training and by selecting complete tasks.

Conclusions and Suggestions

Thus, in the learning process, didactic support was developed for the implementation of teaching in the preparation of students for hierarchical teaching, which includes: the procedure and recommendations for learning the subject with the help of a complex, report and control forms, the procedure for organizing mutual cooperation with the teacher); information and study block (modules of the same size as the study topic - each module is accompanied by tests for self-checking, practical tasks).

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