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ZARIPOVA Gulbahor Kamilovna

Bukhara State University, Faculty of Information Technology, Associate Professor of the Department of Information Systems and Digital Technologies, Doctor of Pedagogical PhD

HAZRATOVA Roila Zainiddinovna

Bukhara State University, Faculty of Information Technology, Department of Information Systems and Digital Technologies, 2nd degree Master of Information Systems (on networks)

DEVELOPMENT OF PROFESSIONAL COMPETENCE OF SPECIALISTS IN THE TRAINING OF TEACHERS IN DIGITAL AND INFORMATION TECHNOLOGIES IN OUR SOCIETY

The article is devoted to the need for professional development and retraining of teachers in the system of continuing education for the preparation of competitive specialists in the modern world. An analysis of the republican and foreign literature on teaching programming knowledge in the field of digital and information technologies in the system of higher education and the formation of programming competencies among students, as well as conducting lessons based on digital technologies in higher education as an urgent pedagogical problem, concluded what is needed. This made it possible to increase the effectiveness of training.

Key words: World education, didactic tools, megatendants, lifelong learning, independent education, information technology, «Digital Uzbekistan – 2030» strategy, IT specialists, IT industry, Action strategy, Continuing education system, imprinting, meraising, authorization, initiation.

РАЗВИТИЕ ПРОФЕССИОНАЛЬНОЙ КОМПЕТЕНЦИИ СПЕЦИАЛИСТОВ ПО ПОДГОТОВКЕ ПЕДАГОГОВ В ОБЛАСТИ ЦИФРОВЫХ И ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ В НАШЕМ ОБЩЕСТВЕ

Статья посвящена необходимости повышения квалификации и переподготовки педагогических кадров в системе непрерывного образования для подготовки конкурентоспособных специалистов. Проведен анализ республиканской и зарубежной литературы по обучению программированию знаний в области цифровых и информационных технологий в системе высшего образования и формированию у студентов компетенций программирования, а также проведение уроков на основе цифровых технологий в высшей школе как актуальное направление. педагогическая проблема, сделал вывод, что нужно. Это позволило повысить эффективность обучения.

Ключевые слова: мировое образование, дидактические инструменты, непрерывное обучение, независимое образование, информационные технологии, стратегия «Цифровой Узбекистан – 2030», ИТ-специалисты, ИТ-индустрия, Стратегия действий, Система непрерывного образования, импринтинг, оценка, авторизация, инициация.

JAMIYATIMIZDA RAQAMLI VA AXBOROT TEXNOLOGIYALARI SOHASIDA PEDAGOG TAYYORLASH BO'YICHA MUTAXASSISLARNING KASBIY KOMPETENTSIYASINI RIVOJLANTIRISH

Maqolada raqobatbardosh mutaxassislarni tayyorlash uchun uzluksiz ta'lim tizimida pedagog kadrlar malakasini oshirish va qayta tayyorlash zarurligiga bag'ishlangan. Oliy ta'lim tizimida raqamli va axborot texnologiyalari sohasidagi bilimlarni dasturlashni o'rgatish hamda talabalar o'rtasida dasturlash kompetentsiyalarini shakllantirish bo'yicha respublika va xorijiy adabiyotlar tahlili, shuningdek, oliy maktabda raqamli texnologiyalar asosida darslar o'tkazish dolzarb yo'nalish sifatida qaralgan.

Kalit so'zlar: jahon ta'limi, didaktik vositalar, uzluksiz ta'lim, mustaqil ta'lim, axborot texnologiyalari, "raqamli O'zbekiston-2030" strategiyasi, it-mutaxassislar, it-sanoat, harakatlar strategiyasi, uzluksiz ta'lim tizimi, imprinting, baholash, avtorizatsiya, tashabbus.

Relevance and necessity of the article. In today's world, when technology is rapidly developing in all areas of life, the virtual world, remote offices, cloud technologies, online practices, highly sensitive devices and artificial intelligence technologies, those who can use these technologies improve them, and moreover, new One One of the most important tasks is the need to train specialists capable of discovering innovative technologies, able to fully comprehend world experience, capable of being faithful children of

their Motherland through the development of this area, able to contribute to the development of the country through their knowledge and skills at different stages of development. Among the developed countries, countries such as the US, Germany, UK, Singapore, China, France are working on methods of using digital technologies in education and transferring modern knowledge in modern ways.

In conditions when the processes of globalization, automation, digitalization are rapidly prevailing in the world community, one of the first stages in the training of mature personnel is a comprehensive school. The correct organization of the educational process in general education schools, the constant harmonization of the curriculum with the requirements of the time, the creation of a system that ensures the interested study of subjects by students, and a high level of assimilation of subjects that increase performance is one of the main tasks facing teachers and methodologists. To achieve these goals, it was necessary to organize training based on modern approaches, study the methodology and principles for the formation of students' competencies in modern knowledge, and systematize them [6].

In our country, much attention is paid to such issues as the use of information technology in every area, digitalization and automation of many areas. According to the Decree of the President of the Republic of Uzbekistan dated January 28, 2022 "On the Development Strategy of New Uzbekistan for 2022-2026", from the State budget for the implementation of the program for updating textbooks in general education secondary educational institutions Allocation of 605 billion soums, construction of new higher schools, increase in private schools, development and the implementation of the republican program to improve the quality of education, improve the quality of education in schools, bring the knowledge and skills of teachers to the international level, setting goals such as optimizing the activities of district divisions of the public education system through full digitalization, shows the presence of topical issues to improve the system of public education.

The scientific novelty of the article is as follows: the program competencies of teachers of higher education have been improved on the basis of integration into the educational process of creative thinking, independent analysis, the ability to create abstract conditions according to the conditions of the task; components of information and communication technologies, such as systematic analysis, manufacturability, evaluation, and opportunities for developing the competencies of teachers, such as design, partial research, research, in mastering knowledge in the field of programming; the model and components of improving the program competencies of teachers based on digital technologies based on software tools, mobile applications, online portals have been improved; the method of application to the educational process has been improved with the help of digital technologies used to identify breakpoints that affect the integrity of the knowledge system when teaching the basics of programming, and to prevent their occurrence.

Development trends in the field of world education indicate the relevance of introducing modern didactic teaching aids in the information society and increasing their effectiveness. «Megatrends» in the context of scientific approaches to the formation of a global educational environment, typical for European countries, show that ensuring the continuity and practical orientation of education, independent education, orientation towards creative development, active use of new formats of education in development. Of particular importance is the creation of modern didactic tools and improving the direction of the introduction of digital technologies in the training of future teachers of computer science, as well as those who are able to apply the mechanisms for their use in the educational process. During the years of independence, a new system of personnel training was created. In our republic, highly qualified, competitive, decisive, meeting modern requirements for the quality of specialists, making a worthy contribution to the scientific, technical, socio-economic and cultural development of the country, consistently training of specialists capable of growth, adaptation to the conditions of rapidly advancing socio-economic development, with high cultural, spiritual and moral qualities is being carried out. In order to achieve better results in the training of personnel, an adequate understanding of the ultimate goals of education, its improvement and modernization of the content, especially the use of interactive teaching methods and modern didactic tools, supertutors (training programs, professional tutors) programs created on the basis of professional activity Conducting a comprehensive targeted work on the application and development of educational programs for computers in the form of «educational materials» is determined by the main directions of strategic tasks in the field of education.

The measures taken to improve the efficiency of the system of professional training and retraining of personnel in the field of information technology create a solid foundation for providing state bodies and network organizations with qualified IT specialists.

In particular, a specialized school for advanced training in information and communication technologies named after Muhammad al-Kharizmi and branches of a number of foreign universities have been launched, digital technology training centers are being gradually created in regions and cities.

At the same time, the shortage of qualified personnel in the labor market of the republic requires the improvement of educational programs and methods in the field of information technology, the strengthening of cooperation between educational institutions and IT companies.

Raise the education of information technology to a new qualitative level, satisfy the need of the labor market for qualified IT specialists, as well as the Action Strategy for the five priority areas of development of the Republic of Uzbekistan in 2017-2021 «Science in order to ensure the fulfillment of the tasks defined in the state program for the implementation of the education and development of the digital economy», respectively, he set many tasks [1].

Today, it is of particular importance to increase the potential of the intellectual resources of our country by improving the software and methodological support for the organization of education in higher educational institutions, the organizational and pedagogical mechanisms for preparing future teachers based on domestic and world educational experience. According to the Action Strategy for the Further Development of the Republic of Uzbekistan [2], «Further improvement of the system of continuous education, increasing the opportunities for quality educational services, continuing the policy of training highly qualified personnel in accordance with modern labor market needs» are important tasks today. In particular, the use of modern didactic teaching aids in the training of computer science teachers is of particular importance. The use of modern didactic tools that allow developing human creativity on a global scale based on a phased (staged) learning model (imprinting – understanding the content of educational material; repetition and memorization; authorization – understanding the content of educational material); educational material and its reproduction; initiation – stages of evaluation and recognition of acquired knowledge); development of new models for the formation of professional competencies using modern learning technologies; integrated use of traditional and modern teaching methods with the help of information and communication technologies; effective use of the possibilities of modern didactic teaching aids in the direction of future teachers of computer science to creative and research work, disclosure of the essence of universal and educational values, as well as regulatory legal documents used to improve the trend of introducing digital technologies in the preparation of future IT teachers are: decree No. PF-4947 of the President of the Republic of Uzbekistan dated February 7, 2017 «On the Action Strategy for the Further Development of the Republic of Uzbekistan»; April 20, 2017 «On the further development of the higher education system for the development of activities» No. PQ-2909 of June 30, 2017; «On measures to radically improve the conditions for the development of information technologies in the Republic»No. PQ5099, 2017; Decisions PQ-3151 of July 27 «On measures to further expand the participation of industries and sectors of the economy in improving the quality of training of highly educated specialists» and the tasks defined in other legal documents related to this activity solve this problem to a certain extent.

Therefore, it should be noted that the information society environment, based on the process of global change, the rapid development of science and technology, the development of information technology, has a strong impact on the education system. One of the main tasks of today's regularly implemented educational reforms and innovation processes is full adaptation to the features of the digitalization process. At the international level, the importance of improving the mutual cooperation of social institutions in the management of the education system is becoming more and more obvious. That is why the development of interactive technologies for informatization of educational processes in higher educational institutions, paying special attention to the improvement of pedagogical mechanisms for creating an integrative educational environment, is one of the urgent tasks. The current stage of the development of the world is characterized by a continuous increase in the volume of scientific information. Law of the Republic of Uzbekistan «On informatization» dated March 21, 2012 «On measures for the further implementation and development of modern information and communication technologies» dated June 27, 2013 Decrees of the President on measures for the further development of the national information and communication system of the Republic of Uzbekistan, ensuring the implementation of relevant regulatory – legal documents of the Government, information and communication technologies, the Internet and multimedia resources in the education system, improving the quality of the educational process by increasing the efficiency of use is an urgent task today [1]. In addition, paragraph 165 of the State Program for the implementation of the Action Strategy for the five priority areas of development of the Republic of Uzbekistan in 2017-2021 in the «Year of Science, Education and the Development of the Digital Economy» directly affects the higher education system related to issues of improvement, in which tasks are defined, related to the informatization of the educational process, and issues of the formation of media competence in accordance with the requirements of the time.

The creation of an electronic information educational environment of an educational institution is not a purely technical issue, but for this it is necessary to use the scientific, methodological, organizational and

pedagogical capabilities of the institution based on a systematic approach. The use of modern information and telecommunication technologies in the educational system is carried out in the following areas:

- information and telecommunication technologies as an object of study, that is, students develop general ideas and skills about new information technologies, their components and areas of application;

- information and telecommunication technologies as a means of education, i.e. knowledge is given to students on the basis of modern information and pedagogical technologies, and lectures, practical and laboratory classes are organized on the basis of modern computer software;

- as a means of managing the educational process, i.e. creation of a system of information, analysis and forecasting to improve the efficiency of all activities of an educational institution, including educational, spiritual and educational and research work;

- as a means of conducting scientific and pedagogical research of students and teachers, that is, the creation and implementation of modern information systems to improve the efficiency of scientific research and pedagogical research among teachers and students of educational institutions.

A computer science teacher working with information technology tools must meet the following qualification requirements, firstly, he must embody the qualities of media competence. The concept of media competence is considered a relatively new term in our educational system and includes the ability to communicate and evaluate media information in various forms, learn and communicate. Media education is a process of personal development through the media [3]. Professor A.B. Fedorov says that media education in the modern world in order to form a culture of communication with mass information, creative, communicative potentials, critical thinking, full perception, interpretation, analysis and evaluation of media texts, self-expression through media Technology considers this as a process of personality development using the tools and materials of mass communication (media) for the purpose of learning in various forms.

Secondly, be able to create electronic textbooks and be able to work freely with them. Thirdly, the ability to work freely in such programs as ZOOM, Google Meet, Google disk, Camtasio studio. And fourthly, the enrichment of the distance education platform with news, etc. Recently, the global coronavirus pandemic has seriously affected the education system, as well as all other industries. Quarantine rules have made many traditional forms and methods of education ineffective. In this situation, the following problems and shortcomings were identified:

- Internet speed is not up to the required level in all regions;

- Insufficient amount of ICT tools in all academic subjects;

- low level of media literacy in academic subjects;

- in the form of distance learning, a number of shortcomings were highlighted, such as the lack of full responsibility for the subjects of study.

The general pedagogical principles of training personnel for the informatization of education can be called:

- invariance of basic training in relation to computer science, its focus on information, communication, general cultural aspects, compatibility with the current level of development of the information society;

- specialization in the training of specialist teachers, i.e. orientation to the introduction of the possibilities of information and communication technologies in a specific subject;

- differentiation of teaching staff training, its focus on personal preferences, professional needs and characteristics of students.

In order to implement the principles of vocational training for computer science teachers and implement the principles of a differentiated approach, when developing the structure of the curriculum, it is necessary to reflect:

- the state of the process of informing students. Society in educational programs;

- theoretical bases of informatization of education;

- the main organizers of the activities of the specialists of the teaching staff on the use of information and communication technologies in a specific subject in educational programs;

- methodical support of independent educational activity.

At present, the teaching of subjects using computers is becoming increasingly important. Informatics teachers use a computer not only to prepare methodological materials for the lesson, but also use the necessary computer programs when teaching a subject, using it as a means of individual work with students. The convenience of the interface, which is part of the computer software, enables teachers to effectively master modern information technologies. Thus, it is possible to effectively use the possibilities of information and communication technologies in the development of student-centered education and in the formation of students' creative abilities. Another important aspect of the reasonable use of computer technology in the educational process is the creation of a computer model of real processes and experiments.

Computer data processing, modeling and display of results often replaces the need for expensive experimental equipment, in some cases (atomic and quantum physics, semiconductors, chemistry, biology, astronomy, medicine, process modeling related to sciences such as history) is considered the only way to demonstrate these processes. Modern information technologies teach phenomena and processes in the micro – and macrocosm, complex devices, biological systems based on the use of computer graphics and modeling, represent physical, astronomical, chemical, biological processes occurring at a very high or low speed, in a convenient form. The time scale helps to solve new didactic tasks. Therefore, one of the promising areas for the introduction of modern information technologies in education is computer modeling of events and processes. Computer models help the teacher harmonize the content of the traditional lesson and display a variety of effects on the computer screen, organize new, non-traditional learning activities for students.

In the process of educational reforms being carried out in our country, the use of modern information and communication technologies in the educational process, the world educational resources of the teaching staff of higher educational institutions and young researchers, the use of electronic sources of modern scientific literature, as well as modern sociological research on the introduction of pedagogical technologies and the study of problems related to the principles of informatization of educational processes in higher educational institutions. In particular, regarding the situation in the higher education system during the pandemic, there is a discrepancy between the current level of development of science, engineering and technology in the higher education system and the process of improving the quality of professional training of future computer science teachers. The issue of large-scale implementation is becoming more and more relevant. The creation of an electronic information educational environment of an educational institution is not a purely technical issue, but for this it is necessary to direct the scientific, methodological, organizational and pedagogical capabilities of the institution based on a systematic approach. Based on this, the concept of «electronic information and educational environment» can be defined as a set of software, information technology, educational and methodological systems that provide a specific purposeful educational process. As a result of analytical studies, it was determined that the electronic information and educational environment can be described according to the following typological features:

1) An electronic information and educational environment of any level is considered as a complex structured object of a systemic nature.

2) The integrity of the electronic information and educational environment, as well as the concept of achieving consistency, meaning their harmony, embodies the educational goals of implementing the personal and professional model of a graduate of an educational institution.

3) The electronic information and educational environment is a factor influencing the effectiveness of education and training, as well as its tool.

The results of the analysis of teaching technical, technological and specialized subjects in the process of teaching computer science in higher educational institutions, existing pedagogical software and the state of pedagogical practice showed a number of disproportions. Including:

- information and communication technologies, in particular, between the social order for the training of highly qualified computer science teachers who are able to use modern didactic tools in the educational process, and insufficient didactic, educational and methodological support for use in the educational process;

- between training based on traditional educational methods and means and modern requirements for the level of information culture, professional skills and knowledge of a specialist;

- between the need for modern didactic teaching aids and the insufficiency of such means in the process of teaching technical, technological, general professional and profile subjects to computer science teachers of higher educational institutions.

The process of informatization of the educational system is qualitatively rising to a new level, that is, the issue of using modern didactic teaching aids to build the educational process and organize the interaction of all participants in this process is successfully solved. However, the emergence of new types of modern didactic teaching aids and updating their content do not always meet the ever-changing requirements for the educational process in the context of digital information. Therefore, there is a need to prepare future teachers of informatics not only for the use of modern didactic teaching aids, but also for the development of electronic educational and methodological materials used in the process of designing and conducting training sessions. In modern conditions, the following professional and personal qualities are required from future teachers of computer science:

- the ability to quickly adapt to changing life situations, the ability to communicate and work in a team;

- good knowledge of modern production technologies, the ability to independently acquire new knowledge;

- Ability to use information technology.

Among them, you can add the following:

- activation of the creative activity of students and taking into account their individual preferences, the formation of the readiness of the future computer science teacher to solve professional problems using modern didactic teaching aids;

- training of competitive specialists with high professional competencies and creative abilities that determine the planned result of mastering general professional subjects;

- application of knowledge on providing information about various types of technical objects in the process of creating working documents;

- application of the acquired knowledge and methods of modeling and design in the performance of design work [8].

The important socio-political, economic, legal, and cultural changes currently taking place in our society require an integrated approach to the problem of training future computer science teachers. With this in mind, a systematic approach was applied to the organization of work on the creation of modern didactic teaching aids. The systematic approach made it possible to determine the sequence, order and stages of creating modern didactic teaching aids. Each stage of work (except organizational) ended with the creation of a specific educational and program document. The following activities were included in the implementation of each stage:

- definition and detailed description of the goals and objectives of training qualified specialists;

- analysis of the conditions, means and methods for achieving the goals set; scheduled work 18;

- organization and performance of work;

- self-control and verification of results.

Clarification of the program of the subjects «Computer Science», «Computer Science and Information Technology», «Information Technology in Education» and «Information Technology» includes an assessment of the issues identified in its thematic components, quantitative characteristics and content of structural units determined by the hierarchical levels of educational material, the necessary identification. The names of the structural units of modern didactic teaching aids are chosen in accordance with the hierarchical levels of educational material [5].

In the process of studying at higher educational institutions «Computer Science», «Computer Science and Information Technology», «Information Technology in Education» and «Information Technology», the study programs «Informatics», «Computer Science and Informatics», «Modern didactic tools in teaching information technology» are provided, «Information technologies in education» and «Information technologies» allow:

- manage the educational process using automated databases, providing information tools and technologies;

- improving the technology of choosing the content of education, methods and organizational forms;

- to create methods aimed at the mental development of future teachers of computer science, the formation of their ability to independently receive education, search for information, conduct experiments, conduct research;

- development of tests and diagnostic methods that allow to objectively, systematically and promptly monitor and evaluate the level of knowledge of future computer science teachers;

- the creation of pedagogical technologies aimed at developing the training of future teachers of computer science, independent acquisition of knowledge, and the formation of information processing skills [7].

For the manifestation of operational abilities, an informatics teacher needs to educate students with a set of knowledge, skills, personal qualities necessary to create modern didactic means of component learning. Based on the foregoing, it can be noted that the technology of training future teachers of computer science based on the technology of creating and using modern didactic teaching aids can include: organization and management of the educational process; theory of formalization and coding (digitization) of information; assigning part of the teacher's function of providing information to computer teaching aids, the main thing is to manage the cognitive activity of students with the help of automated systems.

The technology for creating modern didactic teaching aids was based on the following ideas taken from various fields of science [4]: control theory (algorithmization of students' activities, modern teaching methods for teaching certain tasks of a teacher.

Scientific and practical significance of the research results. The scientific significance of the research results is determined by the possibility of using the improved and proposed model, program and

methods in the study of the process of teaching digital and information technologies in higher education, improving the methods used in teaching students the basics of programming.

The practical significance of the study is explained by the fact that scientific and methodological recommendations for improving the methodology for the formation of program competencies of teachers and students can be used in the creation of textbooks, teaching aids, teaching aids, electronic educational resources, lectures, seminars and trainings, on the practice of professional development of school teachers and their training system.

The conclusions from the article are as follows:

1. An analysis of the republican and foreign literature on teaching programming knowledge in the field of digital and information technologies in the system of higher education and the formation of programming competencies among students, as well as conducting lessons based on digital technologies in higher education as an urgent pedagogical problem, concluded what is needed. This made it possible to increase the effectiveness of training.

2. All sections of the textbook on digital and information technologies were analyzed and the methods used in teaching subjects were studied.

3. Great opportunities for the use of digital technologies in the formation of students' program competencies have been identified.

4. Improved methods of using digital technologies in teaching university students programming.

5. In order to effectively use the extracurricular time of students, directing them to receive the necessary information on the Internet, principles and mechanisms for transferring knowledge about programming in social networks were developed, taking into account their age and psychological capabilities.

6. Methodological suggestions and recommendations for the development of methodological developments, the design of lectures and practical classes, increasing the competence of teachers and students in the field of programming in the modern digitalization process, students' interest in programming, improving the quality of science teaching. To a certain extent, this serves to improve the quality of teaching " Digital and Information Technologies", the development of science and education.

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