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## **Innovative approaches in training specialists in conditions of digitalization of education**

The article discusses the main factors of the introduction of digital educational technologies that contribute to the integration of the information infrastructure of the education of the Republic of Kazakhstan into the world educational environment. Highlighted priorities for creating a unified information educational environment and the introduction of an e-learning system. The legal acts on the implementation of the development of digitalization of education have been implemented. The authors show the main tasks of e-learning in educational institutions in Kazakhstan. Particular attention is paid to the introduction of new educational programs of technical and vocational, higher education. The article describes the possibilities of an innovative approach to the formation of the educational environment in the university during the training of specialists in the conditions of digitalization. The training of specialists in the conditions of digitalization of education dictate the direction of the formation of the educational environment. Therefore, the authors pay special attention to a comparative analysis of the goals and content of training in the system of vocational education and training and universities. On a basis of analysis, the authors focus on the application of an innovative approach to the training of a new generation of specialists in the conditions of digitalization of education.

*Keywords:* digital educational technologies, e-learning system, digitalization of education, educational programs, systems of technical and vocational education, higher education, educational environment, training.

At present, the information and communication infrastructure of Kazakhstan is becoming a major factor in the development of the country's socio-economic capital, and the introduction of digital educational technologies will contribute to the integration of the educational information infrastructure of the Republic of Kazakhstan into the global educational environment.

In the Republic of Kazakhstan, education is recognized as one of the most important priorities of the long-term Strategy «Kazakhstan - 2050». The overall goal of educational reforms in Kazakhstan is to adapt the education system to a new socio-economic environment, to world educational standards [1].

Most of the state programs for the development of education in Kazakhstan determine priorities for creating a unified information educational environment and introducing an e-learning system.

Realization of the development of e-learning is carried out in the context of improving the regulatory legal framework of the Law of the Republic of Kazakhstan «On Education» [2], the State Program for the Development of Education of the Republic of Kazakhstan for 2016–2019 [3], the State Program «Digital Kazakhstan» [4], Professional Standards and Professional Standards Directions «Information and communication technologies» [5], professional standard «Teacher» [6] with specific requirements for the teacher.

In the State Program «Digital Kazakhstan» for 2017–2020, it is noted that the development of the education sector contributes to the introduction of innovations, provides young people with the necessary knowledge and skills necessary for competitiveness in the modern labor market and is one of the key drivers of economic growth [4].

Currently, many countries have come to a society with a highly developed economy based on knowledge and information. In the modern world, the education system should put every person and his needs at the center of his attention and it is necessary to adapt educational systems to the new realities of the 21st century, in which human resources and their development become the most important capital. Consequently, education should become such a social institution that would allow a person to study continuously, and ensure the possibility of obtaining a secondary, higher, postgraduate and further education.

The transition to digitalization requires the education system to solve a fundamentally new problem of training specialists adapted to the rapidly changing realities of the surrounding reality, able not only to perceive, store and reproduce information, but also to produce new, manage big data and efficiently process it. Changes in the requirements for training specialists are dictated by the emergence of new types of theoretical and practical tasks that differ in their systemic and interdisciplinary character, non-standard character, and global nature of possible consequences. Such tasks do not have simple and unambiguous solutions, which

requires a significant change in the nature of the entire professional activity of specialists and necessitates training new specialists who can see the situation as a whole, approach the search for solutions creatively, able to predict its result, aware of their personal contribution and responsibility.

The education system of the Republic of Kazakhstan is focused on entering the world educational space, therefore the quality of education is considered in the context of compliance of the level of educational services received with international standards and norms. In this case, the priority is to achieve a quality of training that will enable them to compete in the international labor market. Acquiring quality education is the constitutional right of every citizen of the Republic of Kazakhstan.

The priority development of IT education, raising the level of information security and the formation of the basic infrastructure of the IT industry, the provision of IT services and software development sectors is a necessary measure for the Republic of Kazakhstan to become one of 30 competitive countries. In his Message - «New opportunities for development in the conditions of the fourth industrial revolution», the Head of State stressed that the world is entering the era of the Fourth Industrial Revolution, an era of profound and rapid changes: technological, economic and social, and paid particular attention to the fact that «it is necessary to actively implement integrated information technology platforms. In higher education, you need to increase the number of graduates who are trained in information technology, working with artificial intelligence and «big data» [7].

Thus, the IT industry is becoming one of the main key factors in the development of the new «smart» or as it is sometimes called the «digital» economy and its «cementing» material and the tasks of introducing high technologies and innovations set by the Head of state in Kazakhstan require government support.

The IT industry is the engine of the global economy. In the information age, IT and information infrastructure contribute to the creation of new business models, goods and services, new discoveries and inventions, in general, are the scientific and technological key to a fundamental restructuring of the organization of business models, indirectly increasing the overall competitiveness of the economy.

The widespread use of IT is primarily associated with a dynamic trend in the development of innovations in this field, which is gaining more and more momentum from year to year. Today, the Internet, cloud computing, mobile and multimedia technologies, social technologies, big data, intelligent systems and much more have become an indispensable attribute of countries with a smart economy [8].

At present, the functions of education, the school, and the professional status of the teacher are complicated by the changes in society. New conditions associated with changes in education and at school put forward new requirements.

Everything is integrated in the world: economy, science, culture, approaches and concepts. In this connection, the need for personal development, its qualitative changes, responsibility and readiness for self-realization, the ability to socialize and adapt to a rapidly changing world will increase, the ability for creativity will be required, and the demand for knowledge will increase.

In the conditions of modern education, the most relevant is the activity characterization that is the key to improving the efficiency of education, since «the abilities are manifested and developed in activity».

Improving the regulatory framework in the field of technical and vocational education:

1. Amendments were made to the Law of the Republic of Kazakhstan «On Education» in terms of the inclusion of the norm, which provides the LEB to implement the state educational order in educational organizations.
2. Amendments have been made to the State obligatory education standard TVE in terms of the module-competence approach in personnel training (DGRK dated August 15, 2017 No. 484).
3. The professional standard of a teacher with specific requirements for a teacher is approved (order by the NChE of Atameken dated June 08, 2017 No. 133).

The main objectives of e-learning in educational institutions in Kazakhstan:

- ensuring equal access of all participants in the educational process to the best educational resources and technologies, aimed at mass quality education;
- creating a full-fledged educational space and providing comprehensive support for the individual development of each student;
- technologization of the educational process, providing mass quality education;
- automation of the management system of secondary general education;
- development of the infocommunication culture of schoolchildren and teachers.

The common components that provide the foundation for e-learning are: infrastructure and telecommunications support, content provision, staffing — the presence of teachers ready for the effective use of the e-learning system [9].

The basic component for the implementation of the e-learning system is a high-quality network infrastructure, modern hardware and software platforms that correspond to the tasks of organizing the content of training courses and the learning management system.

The Ministry of Education and Science of the Republic of Kazakhstan in pursuance of the paragraph of the Action Plan for 2011–2015 for the implementation of the State Program for the Development of Education of the Republic of Kazakhstan for 2011–2020 (stage I) is implementing the project «Implementation of the e-learning system in organizations of secondary, technical and vocational education».

The aim of the project is to ensure equal conditions of access for all participants in the educational process to quality educational services and resources through the use of information and communication technologies.

On behalf of the Head of State, in 2017, in 318 colleges, the project «Free TVE for all» is being implemented, which provides for free first-time qualifications and social support in the form of scholarships, travel and one-time hot meals.

The TVE organizations have placed a state order for more than 100 thousand places, including 21 thousand under the «Free TVE» project.

There are 824 colleges in the republic (2016 — 817) (state — 476, private — 344), they are visited by 489.2 thousand people (2016 — 489.2 thousand).

Updated 130 model curricula, programs and developed 53 educational programs. The classifier of professions and specialties of TVE has been revised. 500 units of foreign literature were translated into the state and Russian languages, the library fund of 288 colleges was replenished.

New educational programs on international standards WorldSkills are being introduced. From September 1, 2017, according to 260 qualifications, new modular programs have been launched, where up to 3 qualifications will be received.

The SCES of technical and vocational education was amended to allow colleges to change educational programs up to 50 %, with dual education taking into account the needs of employers - up to 80% (77/7 of RK dated August 23, 2012 No. 1080).

The project «Мәңгілік ел жастары – индустрияға» — «Серпін» is being implemented in 38 schools of TVE. In 2017, the release amounted to 1,024 people. 662 people or 65 % of graduates are employed (2016 - graduation amounted to 125 people, 56 % were employed).

Developed and implemented modular programs to improve the qualifications of the teaching staff of TVE. In 2017, according to these programs, 5,200 teaching staff, including 300 college managers, underwent advanced training. A pool of managers with innovative management approaches was prepared.

There is a positive trend towards the introduction of elements of the dual education system. In 2017, dual training was implemented in 460 colleges (2016 — 421 colleges) with the participation of 3,055 enterprises in 80 specialties and 165 qualifications. The contingent consisted of 31,607 students.

To improve efficiency in planning and financing of the TVE system, a new methodology for per capita financing has been approved, taking into account the costs of vocational training, practical training, etc. (orders of the Ministry of Education and Science of the Republic of Kazakhstan dated November 27, 2017 No. 596 and No. 597).

When analyzing the existing educational programs of the information profile in the Karaganda region there are the following specialties in the field of technical and vocational education 130400 Computers and software; 1304000 Computers and software; 1304000 Computers and software (by type).

At the same time, today in the higher school of Kazakhstan, the following IT specialties are taught: 5B070300 — «Information systems»; 5B070200 — «Automation and control»; 5B070400 — «Computing equipment and software»; 5B070500 — «Mathematical and computer modeling»; 5B071900 — «Radio engineering, electronics and telecommunications»; 5B100200 — «Information security systems»; 5B011100 — «Computer science»; 5B060200 — «Computer science» [10].

The training of information specialists in educational programs in the context of achieving educational results meets the requirements of the State Compulsory Educational Standard of the Republic of Kazakhstan and is aimed at training personnel for enterprises and organizations of various forms of ownership, developing, implementing and operating information technologies in various fields of human activity [11].

In Kazakhstani universities, they began developing new educational programs in the IT sector, such as: Developer / tester software with the knowledge of the following programming languages: Java; C / C ++; Python; C#; Javascript; Ruby; PHP; Swift; Objective C; Programming and modeling of robots; Technology and software maintenance processes; Specialist in three-dimensional graphics; Development of models BIG DATA; Information Systems Architect; Computer modeling; Machine learning and data development; Artificial Intelligence; Robotic systems; Teacher in the field of robotics; Big data «Bigdata»; SMART infrastructure design.

In the KSU of the name of academician E.A. Buketov is training information professionals in the following educational specialties 5B070300 — «Information Systems» 5B070500 — «Mathematical and computer modeling»; 5B011100 — «Computer science»; 5B060200 — «Computer science».

The main tasks are to prepare a new generation of graduates in the IT field:

- possessing the skills of highly efficient use of tools and methods for creating automated information processing and control systems;
- ready to use modern computer equipment and automated systems;
- ready to work in a competitive environment in the labor market specialists in the field of computer science and computing;
- able to solve professional problems in order to achieve financial stability and strategic effectiveness of automated systems at different stages of its life cycle.

Based on the analysis of the state classifier of the Republic of Kazakhstan, it was concluded that so far the only potential specialists to work in the IT field of activity are graduates of information specialties.

Thus, the main task of modern education is to create an environment that makes it easier for a young person to discover their own potential. This will allow him to act freely, cognizing this environment, and through it the world around him. The new role of the teacher is to organize and equip the appropriate educational environment and to encourage the teacher to learn and to work.

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### **Білім беруді цифрландыру жағдайында мамандарды даярлаудағы инновациялық тәсілдер**

Мақалада Қазақстан Республикасының білім берудің ақпараттық инфрақұрылымын әлемдік білім беру ортасына интеграциялауға ықпал ететін цифрлық білім беру технологияларын енгізудің негізгі факторлары қарастырылды. Біртұтас ақпараттық білім беру ортасын құру және электрондық оқыту жүйесін енгізудің басымдықтары бөлінді. Білім беруді цифрландыруды дамыту жөніндегі нормативтік-құқықтық актілер орындалды. Авторлар Қазақстанның оқу орындарында электрондық оқытудың негізгі міндеттерін көрсетті. Техникалық және кәсіптік, жоғары білім берудің жаңа білім бағдарламаларын енгізуге ерекше көңіл бөлінеді. Мақалада білім беруді цифрландыру жағдайында мамандарды даярлау кезінде университеттегі білім беру ортасын қалыптастыруға инновациялық тәсілдің мүмкіндіктері сипатталған. Білім беруді цифрландыру жағдайында мамандарды дайындау білім беру ортасын қалыптастыру бағытын белгілейді. Сондықтан авторлар ТЖКБ жүйесіндегі және университеттердегі білім берудің мақсаттары мен мазмұнын салыстырмалы талдауына ерекше назар аударды. Талдау негізінде олар оқытудың цифрландыру жағдайында жаңа буын мамандарын даярлауға инновациялық тәсілді қолдануды қажет етті.

*Кілт сөздер:* цифрлық білім беру технологиялары, электрондық оқыту жүйесі, білім беруді цифрлау, білім беру бағдарламалары, техникалық және кәсіптік білім беру жүйесі, жоғары білім беру, білім беру ортасы, даярлау.

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### **Инновационные подходы при подготовке специалистов в условиях цифровизации образования**

В статье рассмотрены основные факторы внедрения цифровых образовательных технологий, способствующие интеграции информационной инфраструктуры образования Республики Казахстан в мировую образовательную среду. Выделены приоритеты по созданию единой информационной образовательной среды и внедрению системы электронного обучения. Проанализированы нормативно-правовые акты по реализации развития цифровизации образования. Авторами показаны основные задачи электронного обучения в организациях образования в Казахстане. Особое внимание уделено внедрению новых образовательных программ технического и профессионального, высшего образования. В статье описаны возможности инновационного подхода к формированию образовательной среды в вузе при подготовке специалистов в условиях цифровизации образования. Подготовка специалистов в условиях цифровизации образования диктует направленность формирования образовательной среды. Поэтому авторами особое внимание уделено сравнительному анализу целей и содержания обучения в системе ТИПО и вузах. На основе анализа авторами сделан вывод о необходимости применения инновационного подхода к подготовке нового поколения специалистов в условиях цифровизации образования.

*Ключевые слова:* цифровые образовательные технологии, система электронного обучения, цифровизация образования, образовательные программы, системы технического и профессионального образования, высшее образование, образовательная среда, подготовка.

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