

Digital Technological Solutions Are an Important Factor in The Effective Development of Higher Education in the Republic of Uzbekistan

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Abstract. This article shows the main directions of improving higher education in the Republic of Uzbekistan in the context of the formation of the digital economy. The authors' research is based on real examples of the Tashkent State Economic University. The article proves that the digital transformation and change in the methods and means of teaching students and undergraduates in the context of the pandemic caused by the spread of COVID 19 infection require new technological approaches to teaching and managing the university from the teaching staff and university administration. In this article, the authors conclude that digital technologies individualize the educational process, diversify, develop students' independence, and develop creative thinking skills. Thus, the quality of education improves, and it is not only about the full and high-quality fulfillment of the requirements of the curriculum: classes begin to meet the personal interests and needs of students and undergraduates, which is undoubtedly an additional incentive to master the educational material. Thus, modern technological solutions based on the latest digital technologies contribute to an increase in the efficiency and quality of the educational process in a higher educational institution.

1 Introduction

The formation of the digital economy on a global scale has a great impact on the development of industries and spheres of national economic systems. Technologies such as cloud computing, blockchain, mobile Internet are becoming widespread, robotics, geonomy, new means of energy storage are actively developing, digital platforms, web services, big data processing and analytics technologies, etc. are becoming widespread.

In the Republic of Uzbekistan, a whole range of measures is being taken to introduce digital technological solutions in the industry and the sphere of the national economy. One of the important stages in the development of the digital economy was the Decree of the President of the Republic of Uzbekistan Sh.M. Mirziyoyev "On approval of the Strategy" Digital Uzbekistan 2030 "and measures for its effective implementation", signed on October 5, 2020.

Scientific research by scientists testifies that education is not just a way of transferring knowledge, it accumulates the cultural heritage of the nation, promotes the empowerment of a person, and forms his moral ideals. Education in general and higher education in particular, is one of the conditions for economic growth, increasing the material well-being of the country's population. The level of education has a significant impact on various aspects of human life: health, perception of culture and art, professional and political mobility, etc. It is no coincidence that in the

Universal Declaration of Human Rights, the right to education is enshrined as one of the basic human rights.

The role of education in increasing labor productivity, increasing the production of goods and services, as well as increasing workers' income is assessed within the framework of the theory of the so-called human capital. Within the framework of this theory, human capital is assigned a central role, and the most important goal is the creation of such a socio-economic system that will ensure the development and use of the capabilities of each person. Human potential is the main part of the country's national wealth. In developed countries (Japan, Canada, USA, etc.), the share of human capital in the country's national wealth is 60 to 80%. However, a high level of education is not a guarantee of economic growth in the country. The reasons for the lag in the economic development of countries with a high level of education may be the following:

- irrational structure of education;
- ineffective use of the existing educational potential (for example, when a person is forced to perform work that does not correspond to his level of education);
- low level and inadequate structure of investment in education;
- low quality of education;
- insufficiently clearly chosen strategy for the development of education.

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In the modern period, the main directions of the development of higher education in the Republic of Uzbekistan are:

- comprehensive assistance to the professional education market;
- the priority of forming a "talent pool" for the development of promising markets and technologies, training of personnel for those industries that have not yet begun to present a wide effective demand for graduates (creating a scholarship fund for those students who will choose areas and specialties that are priority for the state);
- the formation of innovative and corporate cooperation as a form of integration of diverse educational institutions of higher and secondary vocational education, research institutes, basic enterprises and organizations, within which educational programs of different levels of vocational education will operate;
- the priority of the scientific function of the higher education system, which directly affects the change in the principles of organizing production;
- the increasing influence of higher education on the labor market through the creation of new technologies and the opening of new areas of social activity.

2 Literary sources and legal documents

In the Republic of Uzbekistan, the development of higher education in the context of the formation of the digital economy is receiving close attention. This is evidenced by the adoption of a number of government documents.

In particular, on October 5, 2020, the Decree of the President of the Republic of Uzbekistan No. UP-6079 "On approval of the "Digital Uzbekistan - 2030" strategy and measures for its effective implementation" was adopted [1], which emphasizes that without the development of digital infrastructure and raising the level of knowledge in the field of digital technologies, further development of the country is impossible. In addition, the digital development of industries and spheres of the national economy requires qualified personnel. In this regard, in the last 3 years alone, a number of decrees and resolutions of the President have been adopted, contributing to raising the level of the higher education system to a new, higher level. (Resolution of the President of the Republic of Uzbekistan "On measures for the further development of the higher education system" No. PP-2909 dated April 20, 2017 No. 18, art. 313, No. 19, art. 335, No. 24, art. 490, No. 37, art. 982; Resolution of the President of the Republic of Uzbekistan "On additional measures to improve the quality of education in higher educational institutions and ensure their active participation in the large-scale reforms being implemented in the country" No.PP-3775 dated 05.06.2018; Resolution of the President of the Republic of Uzbekistan "On measures improvement of the

training system for qualified personnel in demand and the development of scientific potential at the National University of Uzbekistan named after Mirzo Ulugbek in 2019-2023"). In addition, the President of the Republic of Uzbekistan Sh.M. Mirziyoyev issued a decree "On approval of the concept of development of the higher education system of the Republic of Uzbekistan until 2030", which defines the key areas of comprehensive reform of higher education in the country. This document defines the key tasks of transforming higher education in Uzbekistan.

These include:

- increasing the level of knowledge, skills and abilities of future specialists who have the necessary competencies, high moral principles and are able to think independently;
- modernization of higher education;
- social and economic development based on the latest educational approaches.

The reform of vocational education also provides for the creation of "career centers" to assist students with internships and finding a job in the labor market, the formation of an employer base and the effective use of the potential of graduates based on the optimization of the structure of scientific and educational institutions.

The activities of the sphere of higher education are implemented in accordance with a set of government documents and are aimed at cardinal transformations of the teaching and educational process in universities in order to achieve high rating indicators at the world level.

As the present study shows, a wide range of works by domestic and foreign scientists is devoted to the application of modern information and communication technologies in education.

For example, in the works of such scientists as Akimova O.B. [2], Kvashin A.Yu., Kramarenko N.S. [12] it is shown that in the development of higher education in the digital era, technological security of the educational process and digital literacy of the teaching staff are of great importance.

The publications of foreign scientists Anderson T.D., Clark T., Detweiler R. [7], Dillon C., Hillman D. show that the use of methods and means of distance education has a significant place in the development of digital education. The same concept is expressed by such Russian scientists as Ardovskaya R.V., Bakalov V.P., Batygin B.S., Dikov N.R., Ivanchenko D.A. [9], Ignatova N.Yu. [10], Isaev Yu.V., Kanaev V.I., Kozlova N.Sh. [11], Komarova I.N., Mateev D.A., Muromtsev V.V., Prokhorova N.S. and etc.

In particular, we have studied the scientific works of such authors as Alimov R.Kh [3], Begalov B.A. [4], Bekmuratov T.F., Bobodzhanov A.B., Vertakova Yu.V., Tolstykh T.O., Shkarupeta E.V., Dmitrieva V.V. [5], Gayibnazarov B.K., Gulyamov S.S.[6], Dadabaeva R.A., Dzhannadilov Sh.U., Zhukovskaya I.E. [8], Kuznetsova S.A., Markova V.D.[12], Musaliev A.A., Odilov Shch.G., Swan M. [15], Xashimxodjayev Sh.I. [16] etc.

Analysis of literature sources also shows that scientists around the world are studying the phenomenon of the development of digital technologies.

In fig. 1. presents the forecast of analysts of the American analytical company McKinsey International Data Corporation (IDC), specializing in research of the information technology market. As can be seen from Fig. 1, the potential economic effect from the introduction of such technologies should be from 14 to 33 trillion USD.

Experience shows that digital technological solutions cover all sectors and spheres of the modern economy.

Higher education in the modern period is also unthinkable without the use of the latest digital technologies and mechanisms, as well as the capabilities of artificial intelligence.



Fig. 1. Forecast of the growth of the economic effect obtained through the introduction of advanced technological solutions

Source: data from the American analytical company McKinsey International Data Corporation (IDC).

Analysis of literary sources shows that in the context of the digitalization of the world economy, the sphere of higher education needs new management and technological solutions that are designed to bring higher education institutions to the highest levels in international rankings.

The formation and development of the digital economy in Uzbekistan is inextricably linked with the development of information and communication technologies (ICT). Conducted research has shown that a distinctive characteristic feature is the all-round penetration of ICT into various spheres of public life. According to the results of the research, the specialists came to the conclusion that the successful development of the digital economy in a separate country is an important role for the state.

The development of the digital economy in the republic is caused by an increase in the field of those types of economic activity, which are associated with the production of intelligent and industrial products. The functioning of the digital economy creates the basis for innovation and the formation of human capital. In Uzbekistan, the basis of the digital economy

is a set of industries in the sphere of information services. There is a growing dependence of the functioning of the economy on information. Moreover, we are talking about increasing the share of such areas as education, information and communication and intellectual services.

The modern stage of development of the digital economy in Uzbekistan is characterized by the period of state of affairs and high dynamics of development.

The modern stage of development of the digital economy can be assessed on the basis of the following characteristics:

- 1) Computerization of economic activity and the use of electronic internal computer interoperability on the basis of electronic document circulation;
- 2) Connections to the Internet are not only computers, but also the Internet-things, directed at the creation of business models;
- 3) The use of ICT for the involvement of citizens in social activity, the development of new effective forms of interaction with the state authorities;
- 4) The use of effective feedback mechanisms in the framework of the electronic government to ensure the participation of citizens in public life;
- 5) Mobilization of citizens by means of the Internet for solving publicly important tasks, etc.

The basic institutions of the digital economy include electronic commerce, electronic employment, and electronic government, which form the institutional and educational institutions.

In the framework of the electronic commerce as the basic institute of the digital economy, IT companies enter into cooperation with the representatives of other companies, the state and the scientific community. The electronic commerce allows companies to more efficiently and flexibly carry out internal operations.

3 Modern approaches to the organization of education in a higher educational institution in the context of digital transformation

In the conditions of the formation of the digital economy, serious qualitative changes are taking place, which are reflected in the development of all sectors and spheres of the economy, including the modernization of the education system. Scientific research by scientists testifies that education is not just a way of transferring knowledge, it accumulates the cultural heritage of the nation, promotes the empowerment of a person, and forms his moral ideals. Education in general and higher education in particular, is one of the conditions for economic growth, increasing the material well-being of the country's population. The level of education has a significant impact on various aspects of human life: health, perception of culture and art, professional and political mobility, etc. It is no coincidence that in the Universal Declaration of Human Rights, the right to education is enshrined as one of the basic human rights.

Digital technologies are dramatically transforming the content of the taught disciplines and the way they are presented. This is not only electronic presentations or the use of video, but also direct connections to electronic databases, news, ongoing forums, video broadcasts. In modern higher education, virtual (VR) and augmented reality (AR) systems are increasingly used. VR and AR technologies are used in immersive education (IE) programs. Such programs include the use of modern information technologies in the learning process, which takes place inside various virtual worlds and simulations, often in a playful way [8]. This type of training helps to increase engagement, communication between students and interest in the subject, as well as the implementation of projects for real enterprises and organizations.

The digital transformation of the economy is based on the following technologies:

- data mining;
- business intelligence (eng. Business intelligence);
- machine learning (eng. Machine learning);
- artificial Intelligence;
- big data technologies;
- internet of Things;
- blockchain.

Let's consider the specifics of each of these technologies. Data mining - research and discovery by a "machine" (algorithms, artificial intelligence) in raw data of hidden knowledge that was not previously known, non-trivial, practically useful, available for human interpretation. Business intelligence - systems, tools and technologies for data analysis of organizations. Digital transformation is transforming business intelligence into intelligence. It is intelligent business intelligence that is the trend that determines the development of tools that effectively turn a "caterpillar into a butterfly". Machine learning is a class of artificial intelligence methods, a characteristic feature of which is not a direct solution to a problem, but learning in the process of applying solutions to many similar problems. The essence of the machine learning process is the use of algorithms that allow some technical system to draw conclusions from data without following certain rules. Artificial intelligence (AI; English artificial intelligence, AI): the science of creating intelligent technologies; the property of intelligent systems to perform creative functions that are traditionally considered the prerogative of a person. AI allows you to automate and intellectualize repetitive learning and retrieval processes through the use of data. AI functionality and technologies integrate into existing products and intellectualize them at different levels. AI combined with large amounts of data improves various technologies that are used in all areas of the economy. The Internet of Things (English internet of things, IoT) is the concept of a computing network of physical objects ("things") equipped with built-in technologies for interacting with each other or with the external environment, considering the organization of such networks as a phenomenon that can restructure economic and social processes, eliminating the need for human participation from part

of actions and operations. Blockchain (English blockchain, originally a block chain - a chain of blocks) is a continuous sequential chain of blocks (linked list), built according to certain rules, containing information. In the digital economy, blockchain is a very promising digital technology.

The world of education and science is becoming global, the development of digital technologies leads to the removal of language barriers. Universities and individual teachers are actively entering the MOOC market (MOOC - Massive on-line open course) - an already established form of distance learning with open access on the Internet. The number of students who study remotely is increasing, since traditional educational programs often do not keep pace with the dynamics of technology development [17].

The education sector is also undergoing great changes in the Republic of Uzbekistan. In secondary educational institutions of Tashkent and in the regions, such systems as "Electronic Diary", "Assessment of Teachers", "Electronic Student" have begun to work. The Ministry of Public Education and the Ministry for the Development of Information Technologies and Communications were instructed to create 14 special schools for training programmers this year and 82 - next year [9]. In higher education institutions in the context of the pandemic caused by the spread of the virus infection COVID - 19, digital platforms were introduced, which made it possible to conduct online education in universities. Digital transformation implies improving the system of professional development of the teaching staff. In particular, on the basis of the Tashkent University of Information Technologies and IT-parks, a national system of training and certification of information technology teachers will be introduced. Obtaining a certificate upon completion of training will allow teachers to receive a 50 percent salary increase. School teachers will also be rewarded if their students successfully complete the One Million Programmers course [18].

At present, in Uzbekistan, within the framework of the implementation of the Presidential Decree "On measures for the further development of the higher education system", each higher educational institution establishes close partnerships with leading foreign universities and centers. The decree stipulates that well-established partnerships with foreign universities are capable of attracting at least 350 foreign highly qualified teachers and scientists to Uzbekistan to the educational process at universities annually. At the same time, work is underway to widely introduce advanced pedagogical technologies, curricula and teaching materials based on international educational standards into the educational process. Taking into account the prospects for the integrated development of regions and sectors of the economy, the needs of territorial and sectoral programs, target parameters of personnel training are formed in accordance with higher education, directions and specialties of training are optimized. Work is being consistently carried out to solve the problem of creating and introducing a new generation of textbooks into the higher education

system, providing universities with modern educational and scientific literature. Work has been established to translate the latest foreign literature into the Uzbek language.

The digitalization of education makes it possible to gain access to information that was previously available only to experts and scientists. Most publishing houses specializing in educational literature have switched to electronic versions of textbooks and manuals. Thus, there is a transformation of teaching: students have the opportunity to study disciplines in any sequence, on any platform, using technical means and technologies convenient for them, and the task of the teacher is to help students navigate the vast amounts of information.

Thus, it can be noted that the transformation of higher education ensures that each student achieves the necessary educational results due to an individualized educational process, which in turn implies the use of a full range of digital technological solutions.

Currently, the Tashkent State University of economics (TSUE) has accumulated its own experience in using digital technologies in the educational process.

So, during the quarantine period caused by the COVID 2019 pandemic, educational activities at TSUE were carried out using a digital platform, on which teaching materials were placed by the teaching staff. Students studied educational resources displayed on the platform and submitted completed assignments for verification. Work on the basis of this platform allowed students to successfully pass tests in the studied disciplines at the end of the semester.

Practice has shown that distance learning is an interesting process based on the use of all kinds of gadgets. When organizing distance education, the most effective form of material placement is a digital platform. The educational material on the platform is presented in the form of modules, including methodological recommendations for studying the topic, visual and theoretical resources and explanations for practical tasks, links to the necessary literature.

In the course of analyzing the work of the platform for the semester, the university's leadership identified the positive sides and shortcomings in the functioning of the platform. The developed platform was easy enough for students to use. However, it was not possible to carry out laboratory tasks on this platform. In addition, the process of evaluating the practical assignments completed by the students, took a long time.

Assessment of the platform's functioning, analysis of international experience allowed the TSUE management to make a decision to introduce modern software Moodle (Modular Object-Oriented Dynamic Learning Environment) into the scientific process of a higher educational institution. Moodle is a free and open source platform.

The Moodle web application allows you to create a customized learning management system that allows teachers and students to interact effectively online.

Moodle was created at the Australian University of Technology, and from the outset was positioned as an open, easy-to-install and free educational site.

The advantage of Moodle is the ability to use it both on a stationary computer and on any mobile device with the ability to access the Internet.

The platform maximizes the preservation of the traditional values of full-time education. It is a modern, constantly evolving environment. The chat and forum system, which users actively use, makes it possible to quickly identify platform flaws and fix them.

This system is very mobile, it allows teachers to create all kinds of web courses and fill them with educational content. Elements of online courses are various interactive tasks, open-ended questions, text pages, dictionaries, links, files, cases and much more.

In addition, the following positive aspects of the Moodle program should be noted:

- multifunctionality and ease of use, both on the part of students and on the part of the teaching staff;
- the ability to customize and edit student accounts;
- each student can choose a convenient time for study and vary the presentation of the material, both in time and in speed;
- a huge set of components for effective exchange of information: a regular online lesson, chat, questionnaire, forum, terminological dictionary, etc.;
- all passed material, as well as intermediate and final control with teachers' comments, are saved in the system. You can return to them at a time convenient for the student;
- an objective assessment of the student's knowledge;
- the possibility of organizing an e-mail distribution at the request of the student;
- increasing the level of assimilation of educational material through the use of innovative teaching methods;
- the teacher for any course is constantly in touch with the student;
- the functionality of the platform allows you to conduct the learning process both with one student and with a whole group of students.

World practice shows that the improvement of the technical base of universities, the use of artificial intelligence methods, the development of a digital educational environment, the use of electronic scientific publications in various foreign languages of libraries around the world contribute to the achievement of high results in the preparation of competitive specialists.

Based on modern reality, the following priority areas of interaction between universities in Uzbekistan and foreign universities and research centers can be identified: - branches of foreign universities; - joint

faculties; - joint educational programs of double degrees; - attraction of foreign specialists; - advanced training and internships. A very important decision in higher education today is the decision made in 2018, which grants the right to basic (leading) universities, based on the needs of customers, to independently develop and approve curricula and programs in agreement with the Ministry of Higher Education. In addition, in 2018, the universities of the Republic received the right to accept foreign citizens for bachelor's programs outside the admission quota through interviews, without passing tests. The credit-modular system is being implemented in a pilot mode for all forms of education.

In recent years, optimization of directions and specialties of education in universities, taking into account the prospective development of industries and regions, has become widespread in the Republic of Uzbekistan. For example, from the 2018-2019 academic year, the universities of Uzbekistan began training personnel in 66 new areas of bachelor's degree and 48 new specialties of magistracy.

However, it should be noted that with the many possibilities of digital technologies in the field of improving the educational process at a university, their integration into the educational process also causes certain problems.

First of all, these are the problems associated with technical equipment and the ability of each teacher and student to access the unified educational environment of the university from remote regions of the country.

The second problem is that it is necessary to constantly retrain the teaching staff of the university in accordance with the requirements of digitalization. In the context of the development of the digital economy, each teacher needs to improve their knowledge and skills in the field of digitization of educational and methodological material, the development of electronic educational publications, the creation of open educational courses, conduct online classes with constant improvement of communication skills.

Digital technologies contribute to the implementation of the "Digital University" concept, which includes several components at once:

- a complex of information systems for university management;
- implementation of the educational process online;
- effective management of the educational process based on the creation of conditions for taking into account the individual abilities of students;
- the formation of the key competencies of the digital economy among students, faculty, personnel serving the educational process of the university.

We would also like to note that the digital economy contributes to the development of interaction between the university and employers. This is clearly confirmed by the annual holding of Career Days at the Tashkent State Economic University. In particular, we can say that digital technologies help to identify promising professions, contribute to the formation of graduates'

competencies based on the requirements of the economic market.

4 Conclusion

Today, digital technologies throughout the world are developing rapidly, being both an engine of economic growth and a sector that has already significantly changed and transformed economic processes in other industries and continues to influence the formation of a new type of economy based on knowledge, use of information and products of human intellectual labor. In the course of writing this article, the authors revealed that the telecommunications infrastructure in Uzbekistan, compared to neighboring countries, is developing relatively well and stably, but, at the same time, it is necessary to take measures to achieve a higher level comparable to the level of advanced foreign countries. Studies of modern scientists indicate that the successful cooperation of the Republic of Uzbekistan in the field of ICT with foreign partners indicates the great potential of Uzbekistan in this area. In addition, ICT analysts note that Uzbekistan, thanks to constant development, is potentially able to act as a regional "broadband backbone" and telecommunications hub for neighboring countries. Big data and blockchain technologies are becoming more and more widespread in industries and spheres of the economy, artificial intelligence systems and robotization are rapidly developing.

To achieve high results in the preparation of qualified specialists, it is necessary not only to increase the technical capacity of the university, but also to constantly improve the methods and forms of teaching in the context of the digitalization of the economy. And also to improve the research methodology on the effectiveness of methods, forms, teaching aids in an open educational space; their methodological substantiation, including the ratio of traditional and e-learning, contact and independent work of students; methods of monitoring progress and the formation of educational results in the context of the transfer of the educational process to the global network.

Thus, the transformation of the world space in the context of the digitalization of the economy has a great impact on higher education, contributes to the solution of problems in improving the qualifications of personnel, personalization of education, and also makes it possible to integrate into the global educational space using the methods and means of digital technologies and take high steps in the international ranking of universities.

Summing up the above, it should be noted that modern higher education performs a number of socio-economic functions. It helps a person to become a full-fledged, comprehensively educated, in-demand person, and provides conditions for successful social interaction. Thus, we can conclude that the quality of higher education determines the effectiveness of economic development. With an increase in the rate of economic growth, the need for highly qualified

specialists who are able to develop and introduce new methods and technologies increases, which has a positive effect on the system of education development. In turn, the development of the education system, leading to an increase in the number of highly qualified specialists, contributes to economic growth.

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