РОЛЬ ЦИФРОВЫХ ТЕХНОЛОГИЙ В ОБЕСПЕЧЕНИИ УСТОЙЧИВОГО РАЗВИТИЯ

Sarsenbekova Gulnar Alibekovna, candidate of philological sciences, professor, Rector of the International University of Engineering and Technology (MITU), Republic of Kazakhstan

FORMATION AND DISTRIBUTION OF NEW MODELS OF UNIVERSITY FUNCTIONING BASED ON DIGITAL TRANSFORMATION OF ENGINEERING EDUCATION

The article describes the role of digital transformation of universities and scientific organizations in the leading countries of the world and its positive impact on the education and training of future specialists. The use of modern technologies for students to expand knowledge and skills, as well as to develop professional competence that meet modern labor market requirements is considered.

Key words: digital transformation, professional competence, scientific organizations, higher educational institutions, scientific institutions.

Сарсенбекова Гульнар Алибековна, к. филол.н., профессор, ректор Международного инженерно-технологического университета (МИТУ), Республика Казахстан

ФОРМИРОВАНИЕ И РАСПРОСТРАНЕНИЕ НОВЫХ МОДЕЛЕЙ ФУНКЦИОНИРОВАНИЯ УНИВЕРСИТЕТОВ НА ОСНОВЕ ЦИФРОВОЙ ТРАНСФОРМАЦИИ ИНЖЕНЕРНОГО ОБРАЗОВАНИЯ

В статье приводится о роли цифровой трансформации университетов и научных организаций в ведущих странах мира и его положительное влияние на образование и подготовку будущих специалистов. Рассмотрены использование современных технологий для студентов для расширения знания и навыков, а также для развивития профессиональной компетенции отвечающие современным требованиям рынка труда.

Ключевые слова: цифровая трансформация, профессиональная компетентность, научные организации, высшие учебные заведения, научные учреждения.

Сарсенбекова Гүлнар Алибековна, филол.и.к., профессор, Эл аралык инженердик-технологиялык университетинин ректору, Казакстан Республикасы

ИНЖЕНЕРДИК БИЛИМ БЕРҮҮНҮ САНАРИПТИК ТРАНСФОРМАЦИЯЛООНУН НЕГИЗИНДЕ УНИВЕРСИТЕТТЕРДИН ИШТЕШИНИН ЖАҢЫ МОДЕЛДЕРИН КАЛЫПТАНДЫРУУ ЖАНА ЖАЙЫЛТУУ

Макалада дүйнөнүн алдыңкы өлкөлөрүндөгү университеттердин жана илимий уюмдардын санариптик трансформациясынын ролу жана анын келечектеги адистердин билим алуусуна оң таасири келтирилген. Студенттердин билимин жана көндүмдөрүн кеңейтүү, ошондой эле эмгек рыногунун заманбап талаптарына жооп

берген кесиптик компетенциясын өнүктүрүү үчүн заманбап технологияларды колдонуу каралды.

Негизги сөздөр: санариптик трансформация, кесиптик компетенция, илимий уюмдар, жогорку окуу жайлар, илимий мекемелер.

In the era of intensive development of information technologies, the issue of digital transformation of many spheres of socio-cultural life is becoming extremely actual. Education and science are no exception. Due to the fact that the updating of developed devices occurs in a very short time, education, science and medicine must respond as quickly as possible to the changes that occur in our already digital ecosystem in order to adapt and improve.

Digital transformation refers to qualitative changes in the implementation of an organization's work processes in the implementation of its economic activities, subject to the introduction of digital technologies that contribute to significant changes in the work of this organization, as well as having a certain socio-economic effect. The fundamental event of the digital transformation process is, first of all, the formation of fundamentally new models of work for organizations of higher and postgraduate education, the main elements of which are: a combination of digital services and tools; continuous professional development, new infrastructural and organizational conditions for the implementation of changes, support for participants in mastering new roles and methods of working interaction.

Having reviewed and analyzed the current state of scientific and technological progress in different countries, we can conclude that in the modern world, the activities of universities are faced with the progressive influence of digital transformation. Leading countries of the world recognize the importance of this phenomenon and introducing actively innovative technologies into the educational and scientific process. It is fair to believe that the digital transformation of education and scientific knowledge began in the 1980, when there was a paradigm shift in the management of science and the scientific complex in developed countries [1]. For example, the main factor in preparing future professionals in countries such as the USA, China, Japan, India, UAE, Germany and Singapore is precisely the digital transformation of higher education organizations. A paradigm has been introduced here for the rapid implementation of effective strategic business projects based on innovations in the field of IT, aimed at modernizing all areas of human activity, including its educational and scientific components. The education of these countries is now characterized by interdisciplinary, shorter training periods, the emergence of organizations for the formation of applied skills, the introduction of methods and technologies based on distance learning, inclusion and gasification.

The speed of spreading of digital technologies is growing, and relations between subjects of the digital economy are becoming more complex. A clear example is China, where regional technological cooperation is quite developed, not aiming at overcoming the investment deficit, but striving for the diffusion of innovations through the use of the technological potential of other Asian countries [2].

A good example of the continuous implementation of IT solutions in the education sector is Canada, where a special digital program is built into the students' work experience system that allows them to gain real work experience in an enterprise - Virtual work experience - which allows them to visit real production or enterprise and also try themselves as a reporter, for example, or an editor in a local or national newspaper, etc. [2,3]. In this country, the use of HyFlex (Hybrid + Flexible) technology is popular, which means the application of the principles of "hybridity" and "flexibility". This educational learning model combines elements of face-to-face and online learning. Here the student has the opportunity to design an individual schedule and have the freedom to choose a subject and the time to listen to it.

Equal opportunities are provided to students in synchronous and asynchronous learning. It is important to note that the university independently determines the student's study load, which is mandatory for studying in a synchronous mode. The main advantages of HyFlex include: obligatory provision of the teacher with access to current high-tech tools and systems, including the equipment of HyFlex classes includes a 180-degree camera with 30 optical zoom, which makes the learning process more attractive, since the generated image of high quality and the student has the opportunity to see the lecture on his device in detail, unlike, for example, a student sitting at the last desk in the classroom in the classical form of teaching [3].

In the United States the digital transformation of higher education institutions has led to the emergence of many virtual universities, online platforms and online complexes. On the one hand, students got the opportunity to study at anytime and anywhere, but on the other hand, they lost the factor of mentoring and communication with other participants in the educational process. Among the positive factors of the intense influence of digital technologies on the educational component in the United States, it should also be noted that, thanks to the developed digital platforms everyone has a unique opportunity to access the highest quality electronic materials created by professionals in their field. They got the opportunity to communicate with leading international experts. The USA is one of the countries that has paid a lot of attention to gamification and augmented reality systems as a teaching tool. It is still too early to make a conclusion about the benefits of the implemented developments, but there is already a tendency to adapt to the virtual environment and artificial intelligence [4].

In Germany, the digital transformation of universities is aimed at creating more effective and accessible educational resources. This includes developing digital platforms that allow students to access materials and assignments, also interact with teachers and peers in real time. One of the core elements of digital transformation is expanding access to education through open online courses that can be accessible to every student, regardless of their geographic location or financial capabilities.

In Singapore, the digital transformation of higher education institutions plays an important role in promoting a climate of innovation and entrepreneurship. University students study using modern technologies such as blockchain, Internet of things and big data. In addition, universities actively cooperate with industrial enterprises and startups so that students can gain experience in real projects. This helps students immediately apply knowledge into practice and make the transition from university to professional work smoother [5].

If we talk about the modernization of the educational environment in Russia, we can see that there are no significant differences in the global trend in the development of education. One of the main components of the digital transformation of Russian education is the use of electronic textbooks and animated materials. They offer students not only text-based information but also interactive elements such as video lessons, animations, and self-paced activities. This allows students to expand their knowledge and develop skills through more effective use of educational information. The second important aspect of the digital transformation of education is the use of online learning platforms.

Such platforms offer students access to educational materials from a variety of sources, thereby enhancing educational opportunities. They also provide opportunities for communication and collaboration between students and teachers, which promotes collaboration and creative thinking. The third aspect of the digital transformation of education is the use of online courses and massive open online courses (MOOCs). They offer students the opportunity to study subjects that were previously inaccessible due to geographical distance or limited institutional resources. MOOCs also promote self-learning and self-development skills and allow students to study at their own convenience. However, the digital

transformation of education must be accompanied by changes in teaching methods and professional training of teachers.

Teachers must have the skills to effectively use ICT in the educational process to ensure high quality teaching. In addition, leaders of educational institutions must develop a strategy for the digital transformation of education and provide the necessary resources for its implementation. The digital transformation of Russian education has a positive impact on the development and educational environment of the country. It improves the quality of education, the level of accessibility of educational resources and enables students to develop independent work and creative thinking skills. However, the successful implementation of digital transformation requires support from the government, educational institutions and teachers [6].

The influence of the digital environment has significantly affected the scientific progress of all countries of the world. The data management system being developed and implemented in the field of science and higher education ensures improved data quality and systematization of work with it for making management decisions in the implementation of the Digital Transformation Strategy of each individual country. We have received powerful tools for analyzing and assessing the implementation of scientific activities of individual organizations. We have already created a unified information environment that unites several elements of economic activity. For example, on the basis of implemented information and analytical systems, we already have the opportunity to submit an application for research in a single platform; select partners, including international experts; receive feedback from potential suppliers of equipment so necessary for scientific research and more. We have received good tools for monitoring the level of digitalization of educational and scientific organizations.

A number of countries are implementing the "Digital University" project, which covers all business processes of educational institutions of higher education aimed at meeting the needs of participants in the educational process in order to increase the attractiveness and comfort of the educational environment. This involves not only equipping organizations with the most modern equipment, but also introducing special systems into management processes that provide a safe environment, high-quality communication between participants, monitoring the activities of facilities, providing equal access to educational materials, as well as synchronization of processes.

So-called "Software and Equipment Marketplaces" are being created, which involve the creation of a unified information base for the interaction of educational organizations and suppliers, hardware and software vendors, communications with employers and the creation of unified tools for assessing the quality level of educational organizations. Of course, "Digital Education" contributes not only to increasing the level of digital competencies of students, scientific and pedagogical workers, but also to the formation of competent teams for managing the digital transformation of educational organizations [6].

However, it is worth noting some problems that have arisen as a result of the formation of the digital environment. The transition to "industrial" management of science led to the creation of formal quantitative metrics (number of scientific publications, citations) and the introduction of TRL technology - Technology Readiness Level, developed by NASA and adopted by many countries. This circumstance, in a sense, forced universities and research centers to borrow management practices from the business sector. States have begun to provide results based funding for scientific research. However, evidence-based management of research complexes in many countries was impossible without the usage of information systems that could at least partially facilitate the construction of all necessary business processes [7].

According to UN experts the main driver of the new digital economy is an exponential increase in the efficiency of research costs. This is not new in the strategic aspect of

development. Therefore, the main tools will be: a revolution in semiconductor technologies; sources of information, including through the development of cloud technologies; business models based on technology or product platforms that radically change the conditions of competition in a wide range of industries; development of software products adapted for analysis and assessment of activities.

Foreign literature [8-10] notes the fact that everything depends on the race between education and digital technologies, or more precisely: who will gain a leading position in this process. Unfortunately, in a number of countries technology has become the "winner". Today, some Asian countries, including China, are characterized by a growing gap between those who have the opportunity to master advanced technologies and those who fundamentally lack this opportunity, which, of course, negatively affects economic development. One more important negative factor can also be noted: today almost all countries in the world have a problem with the "education-jobs" relationship. This is primarily due to the fact that national education systems operate in such a way that they do not train specialists with the competencies necessary for the labor market. And today, global education systems are in need of serious reform and transformation in order to develop professionals with the right set of technical and digital competencies.

We must recognize the importance of gaining competencies in areas where humans continue to have a significant advantage over artificial intelligence. The present time has also determined the need to expand opportunities for lifelong learning. The rapidly changing environment of modern people often leads to the need for retraining, which requires the development of new skills. And in this regard, educational programs at all levels must become flexible and responsive to changes in market requirements and digitalization. And this, in turn, requires the preparation of highly qualified teaching staff, the formation of which requires serious incentives and investments in the professional development of teachers. Of course, it is necessary to provide teachers with tools which they can take advantage of the latest technologies.

In this regard, the most important issue of modernization has become the introduction of changes in, namely, engineering education. One of the key aspects of the digital transformation of engineering education today is the introduction of virtual and augmented reality into training. These technologies make it possible to create virtual environments in which scientists and students can interact with various objects and processes, simulate and conduct research. For example, they can conduct virtual experiments in physics or configure and debug electronic circuits. This approach allows students to gain hands-on experience and learn in an interactive and more exciting way. Another important aspect of the digital transformation of engineering education is the usage of online platforms and cloud technologies for learning.

This allows students to access a wide range of educational materials, tools and resources, such as specialized software products or cloud computing. Online platforms also provide opportunities for students to share information, discuss projects and collaborate with peers and faculty which helps develop communication skills and collaboration. Another important element of the digital transformation of engineering education is the use of students' electronic portfolio. This is a set of electronic documents, including works, projects and research that a student can present as his achievements. An e-portfolio allows students to demonstrate their skills and knowledge, also increases their ability to self-reflect and analyze their progress.

However, successful digital transformation of engineering education requires not only the introduction of new technologies, but also changes in approaches to education and teacher training. Teachers should develop their skills in using digital tools and integrate them into the teaching process. In addition, it is necessary to actively attract leading industrial companies so that they participate in the educational process through the organization of internships,

practical training and scientific research. Of course, the digital transformation of engineering education contributes to the formation of new models of functioning of universities that actively use digital technologies for effective teaching and training of students. It develops practical skills, stimulates creativity and collaboration, improves access and quality of education. However, for the successful implementation of digital transformation is necessary to involve all specialists and stakeholders and also require support from the state. This is what will allow us to create a new, modern model of engineering education that will meet the requirements of the modern information society and industry.

The digital transformation of universities and scientific organizations in the leading countries of the world has, of course, a positive impact on the education and training of future specialists. Thanks to the use of modern technologies, students gain more accessible access to education, expand their knowledge and skills, also develop their professional competencies. This transformation also helps organizations stay at the forefront of higher education and science by offering innovative programs that meet today's labor market demands.

Literature:

1. Butsyk S.V. Programmy razvitiya informatsionno-kommunikatsionnykh tekhnologiy (IKT) v sfere obrazovaniya Singapura // Otkrytoye obrazovaniye. 2021. N 1. URL:https://cyberleninka.ru/article/n/programmy-razvitiy informatsion nokommunikatsionnyh-tehnologiy-ikt-v-sfere-o brazovaniya-singapura.

2. Krutova I.A., Krutova O.V. Tsifrovaya transformatsiya universiteta: riski i perspektivy // Sovremennyye naukoyemkiye tekhnologii. – 2021. – № 2. – S. 170-174

3. Sovremennaya tsifrovaya obrazovatel'naya sreda (STSOS)//elearning.hse.ru URL: https://elearning.hse.ru/project_scos

4. Astonishing E-learning Statistics for 2021//techjury.net URL: https://techjury.net/blog/elearning-statistics/#gref .

5. Online Education Market Study 2019|World Market Projected to Reach $350 Billion by 2025, Dominated by the United States and China//globenewswire.com URL: https://www.globenewswire.com/newsrelease/2019/12/17/1961785/0/en/Online-Education-Market-Stu dy-2019-WorldMarket-Projected-to-Reach-350-Billion-by-2025-Dominated-by-the-United-Statesand-China.html.

6. Vedushchiye rossiyskiye i zarubezhnyye universitety v usloviyakh tsifrovoy transformatsii obrazovaniya Pis'menskiy G.I., Safonova S.V.Universitet Yevraziyskogo ekonomicheskogo soobshchestva 2Moskovskiy gorodskoy pedagogicheskiy universitet Moskva, Rossiya // Chelovecheskiy kapital, 2022, №12(168) tom 2

7. Petrusevich A.A. Tsifrovaya obrazovatel'naya sreda shkoly kak faktor razvitiya sotsial'nogo kapitala podrostkov // MNKO. 2022. №4 (95).

8. Ontario Ministry of Education, "Achieving Excellence: A Renewed Vision for Education in Ontario," (2014). [Elektronnyy resurs]. — Rezhim dostupa — URL: http://www.edu.gov.on.ca/eng/about/excellent.html . (data obrashcheniya: 20.10.2022).

9. Ontario Ministry of Education, "eLearning Ontario". [Elektronnyy resurs]. — Rezhim dostupa — URL: http://www.edu.gov.on.ca/elearning/blend.html. (data obrashcheniya: 20.10.2022). Dnevnik nauki | www.dnevniknauki.ru | SMI EL № FS 77-68405 ISSN 2541-8327 2022 № 11 Elektronnyy nauchnyy zhurnal «Dnevnik nauki» Susan Howell and Brian O'Donnell Digital Trends and Initiatives in Education: The Changing Landscape for Canadian Content. 2017. [Elektronnyy resurs]. — Rezhim dostupa — URL: http://www.omdc.on.ca/Assets/Research/Research+Reports/Digital+Trends+and+I nitiatives+in+Education/Digital+Trends+and+Initiatives+in+Education.pdf

_____