ОБРАЗОВАНИЕ И ОБУЧЕНИЕ: МЕТОДОЛОГИЯ, ТЕОРИЯ, ТЕХНОЛОГИЯ
БІЛІМ БЕРУ ЖӘНЕ ОҚЫТУ: ӘДІСТЕМЕ, ТЕОРИЯ, ТЕХНОЛОГИЯ
EDUCATION AND TRAINING: METHODOLOGY, THEORY, TECHNOLOGY

I.V. BORDIYANU,[*][1]
PhD, Professor of RAE.
*e-mail: bordiyanuilona@mail.ru
G.ZH. SARSEMBAYEVA,[1]
PhD, associate professor.
e-mail: sgulnar10@mail.ru
A.E. MAMBETKAZIYEV,[1]
PhD, associate professor.
e-mail: Kafu_ukg@mail.ru
[1]Kazakh-American Free University,
Kazakhstan, Ust-Kamenogorsk

PROBLEMS AND PROSPECTS FOR THE DEVELOPMENT OF DIGITALIZATION IN THE SPHERE OF EDUCATION AND SCIENCE IN THE UNIVERSITIES OF NEW GENERATION

Abstract

The aim of the article is to consider the issues of introducing digitalization in all spheres of public life, and especially in the field of education. The task of the introducing digital technologies is to accelerate the pace of economic development of any country, and in particular the Republic of Kazakhstan, thereby improve the well-being of the population through the use of information and communication technologies, as well as ensure, with minimal costs, the transition of the economy of our country to a completely new stage of development, ensuring the creation of a digital economy. Kazakhstan has taken a course towards the development of the digital economy; this is already a requirement of the new time. The country began to switch to the electronic format starting in 2006, but the main obstacles, which showed the real reality, occurred with the COVID-19 coronavirus infection pandemic and the announcement of quarantine. Based on their analysis, the authors concluded that the implementation of digitalization is taking slow steps. In our country, the bulk of our own manufacturers are in no hurry to implement Industry 4.0. due to the fact that it is not only expensive, but also due to the lack of highly qualified specialists in this area. The program "Digital Kazakhstan" has some shortcomings, taking into account previous mistakes, adjustments are made, so the success of its implementation depends on the proper involvement of all subjects of economic activity in the processes of digitalization. The authors are confident that through the development of information and communication and digital technologies, creating a favorable environment for training in digital skills, providing support measures for qualified professionals, we will achieve the goal outlined in the Program "Digital Kazakhstan".

Key words: economic development, digitalization, education and science, university, resources, EEU, information and communication technologies.

Introduction

According to the Message of the First President of the Republic of Kazakhstan N.A. Nazarbayev to the people of Kazakhstan on the transition to the 4th industrial revolution aimed at modernizing all areas of activity based on digital technologies, large-scale changes are taking place in technological terms, not only in the production sphere, but also in education. The time of classical universities is

leaving in their place, innovative research universities are coming, which in turn should become a driver for the country's development, since improving the quality of education and science contributes to positive structural shifts in the economy and social sphere.

Today there are many new terms "digital transformation", "digital ecosystem", "digital divide", "digital citizenship", "digital socialization", "digital reality", this all suggests that digitalization has entered our life and has now become an integral part of it, there is no way back from production to human capital and there is no way back, it is necessary to move forward, keep pace with the times and take a new level of development trajectory of our country.

Main provisions

The concept of "Industry 4.0" originated in 2011 at an industrial trade fair in Hanover, when the government of the Federal Republic of Germany indicated the need for a wider application of information technology in enterprises. Almost all countries of the world began to actively master new technologies, some faster, others slower, so the Fourth Industrial Revolution led to more and more automation of absolutely all processes and stages of production and life.

The digital economy has developed, of course, primarily in countries with a high level of economic development. In terms of opportunities to participate in and benefit from the digital data economy, two countries stand out: the United States and China. Together, they account for half of the world's hyperscale data centers, the world's fastest 5G adoption rate, 94% of all AI startup funding over the past five years, 70% of the world's top AI scientists, and almost 90% of the market capitalization of the world's largest digital platforms [1].

In the context of the Eurasian Economic Union (EAEU), which includes all the member countries of the Eurasian Development Bank with the exception of Tajikistan, the share of the digital economy in the total GDP of the EAEU is less than 3% [2].

This lag behind the advanced countries in the direction of digitalization is explained by the fact that the basis of the economy of these countries is occupied by the agricultural industry, and the introduction of digital technologies is proceeding at a relatively slow pace. In these countries, the introduction of Industry 4.0 can be traced, so to speak. Due to the fact that it is not only an expensive pleasure, but also the absence of highly qualified specialists in this field.

In order to correct this situation and improve the scientific and technical base in comparison with advanced countries, it is necessary to expand access to ICT networks, to increase access to Internet resources and related services for consumers, the manufacturing and non-manufacturing sectors on its territory. Therefore, measures aimed at creating and modernizing communication infrastructures are extremely important to meet the increasing demand for information and communication technology services.

Materials and methods

The development of the digital economy is an urgent problem today, therefore there are many publications in this direction. As for higher education institutions, there are many methods of comparative analysis, assessment, as well as developed methods for the transition to digitalization of educational institutions. At the country level, the State Program "Digital Kazakhstan" has been developed. A rating analysis of the level of digital transformation of the economies of the EAEU and EU countries is carried out.

Results

According to the Cisco Annual Internet Report (AIR), 66% of the world's population will become Internet users by 2023, and more than 28 billion devices will be connected to the global network.

According to IDC, 65% of global GDP will be digitized in 2022. From 2020 to 2023, direct investment in digital transformation will amount to $6.8 trillion. For 2021, 4.66 billion people (60%) worldwide use the Internet, which is 316 million (7.3%) more than last year. The Internet penetration rate is now 59.5% [3].

If we consider the amount of global traffic based on the Internet Protocol (IP), which roughly shows the scale of data flows, it looks like this:

| **1992** year 100 GB per day | **2002** year 100 GB per second | **2007** year 2 000 GB per second | **2017** year 45 000 GB per second | **2022** year 150 700 GB per second |

Figure 1 – The volume of global Internet traffic

Note – Compiled from data [4].

The picture shows that as a result of the growing number of new users on the Internet and the expansion of Internet resources, the volume of traffic will increase at maximum speed.

According to the study, the most significant increase from 2021 to 2030 will occur in telecommunications – from $2 to $10 trillion, information technology – from $5 to $21 trillion, e-commerce – from $9 to $25 trillion, construction – from $13 to $20 trillion, commercial real estate – from $10 to $18 trillion [5].

In 2017, Kazakhstan approved the State Program "Digital Kazakhstan", consisting of five key areas [6]:
- digitalization of economic sectors;
- transition to a digital state;
- implementation of the digital Silk Road;
- development of human capital;
- creation of an innovation ecosystem.

The program promotes structural change by expanding national technological capabilities, start-up industries and other non-resource industries in the economy. In addition, within the framework of the "Strategic Development Plan of the Republic of Kazakhstan until 2025" outlined priority areas of the state, such as "creating the foundations for a new economy", "technological renewal of industries and digitalization", which provide for the development of infrastructure and reduction of barriers to digitalization of the economy, attraction and localization of production of high-performance technology companies, and the formation of a digital culture among the country's population. The total economic effect from the Program for 2020 and 2021 exceeded 714,3 billion tenge [7]. The introduction of digitalization and related technologies has been achieved to a greater extent in such areas as the provision of public services, in education, healthcare, in the financial, transport and mining and metallurgical sectors.

But, during the implementation of the Digital Kazakhstan program, it was not without gaps, one of them is the lack of proper study of foreign experience before introducing this program into our realities, therefore experts in this area say that the program looks unfinished. For example, this can be seen in the field of education in terms of the introduction of distance learning at all levels of education in connection with the transition of Kazakhstanis to a quarantine regime. The Internet system could not stand it, serious problems emerged, periodic technical failures in IT systems. President Kassym-Jomart Tokayev said at a meeting of the State Commission on the State of Emergency: "In order to have a digital state in reality, the next year must pass under the sign of effective digitalization of our state. Taking into account the new experience, the Digital Kazakhstan state program should be revised, of course, without additional financial costs. We have to carry out a radical reform of health care, education and science. The crisis, as I have already said, is so good that it exposes all the shortcomings and brings great opportunities. We must take advantage of them" [8].

Discussion

In order to determine the movement of Kazakhstan in terms of the level of development of the digital economy, it is necessary to determine the place of the country. This map shows the current state of digitalization in the country and its speed. Countries are divided into 4 zones: Leaders, Promising, Slowing, Problematic. As can be seen from the map, Kazakhstan belongs to the "Promising" zone. This zone suggests that the digital infrastructure is still limited, but is rapidly digitizing [9].
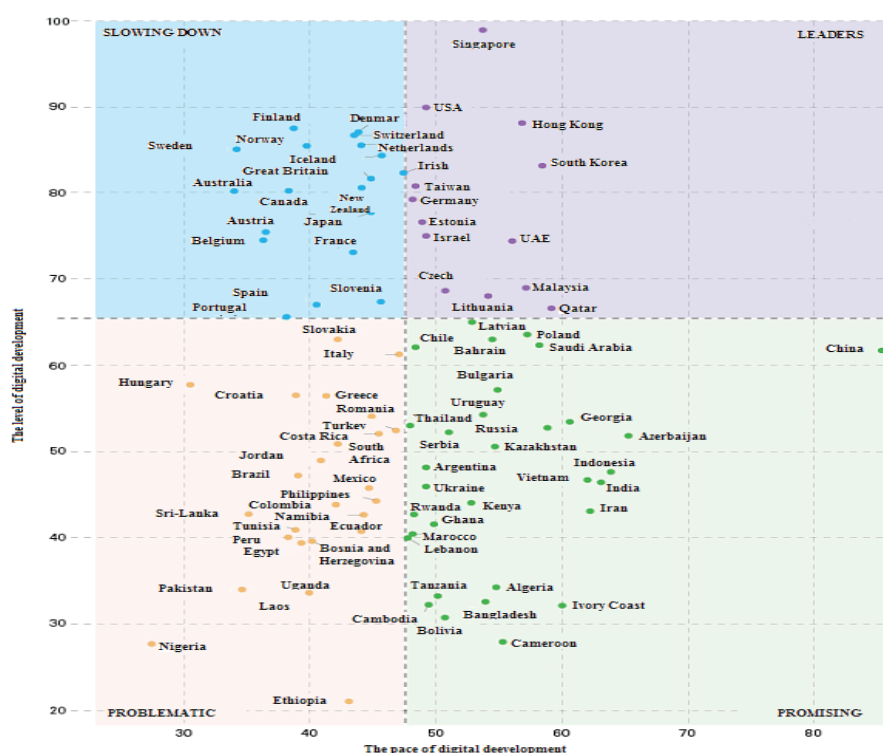
Figure 2 – Digital evolution: status and speed

Note – Compiled from data [9].

Thus, to reach a new level, large investment in the digital economy, supported by the state, is required. It is necessary to promote digitalization both in business and in science, which will entail increased efficiency, reduction in time and cost.

We have been talking a lot and for quite a long time about the introduction of digitalization in education, about the transition to a new level, and most universities are purposefully moving in this direction. The COVID–19 pandemic has made its own adjustments, thereby accelerating the penetration of digitalization into the education system as a whole and directly into the higher education system.

The most important task of education in the Republic of Kazakhstan is its digital transformation. Information and educational environment of digital education includes:

⬧ technical resources: computers, tablets, mobile devices, networks, video systems, interactive screens;

⬧ educational resources: software, electronic educational resources, information and educational portals, distance learning systems, electronic libraries, cloud resources, webinars, teleconferences;

⬧ process management: distance learning, e-mail, social networks, personal account in the cloud, training form.

As part of the implementation of the Strategic Development Plan of the Republic of Kazakhstan until 2025 for the digitalization of business processes in science, the task was set to introduce a national information system for scientific activities, which will also allow analyzing and forecasting scientific and technological development. Since 2017, an information system has been put into operation, developed by the National Center for State Scientific and Technical Expertise, an information system for online submission of applications for a competition within the framework of grant funding and program-targeted funding, receiving reports on research and development work carried out. Currently, more than 35 thousand scientists participating in the competitions have registered with the IS and have created their "personal accounts". About 6,000 applications were submitted for 14 competitions and about 18,000 expert opinions were received. In the new information system, a module has been developed that allows to optimize the work of the National Scientific Council. Each member of the council at a convenient time for him can work with applications and reports online. The system also

displays the decisions of the national scientific council on the approved amounts of funding and all adopted changes according to the applications of the applicants [10].

Kazakhstan is also implementing a set of measures aimed at developing the innovation ecosystem as a whole. On November 6, 2018, the AstanaHub international technopark was opened, where conditions are created for the free development of Kazakhstani and foreign technology companies. The mission of AstanaHub is to become a center for the development of innovative projects, release breakthrough IT companies, and also become a hotbed for attracting a critical mass of young and talented IT specialists from all over the world. This technopark also operates in the educational direction. On the basis of the technopark, an academy was created – a platform for the implementation of educational programs in the field of technology business. The training will take place in various forms, both full-time and part-time. The content and educational program is based on the best world practices and the needs of market participants. It also serves as the basis for the Alem IT school, which uses modern teaching methods. An innovative IT university was opened in September 2019. The vision of the university – Astana IT University – is a leading competence center for digital transformation in Central Asia [11].

Also one of the leading universities in Kazakhstan in the field of information technology is JSC "International University of Information Technology" – this is a leading university that trains qualified internationally recognized IT specialists. Over the past year, JSC "International University of Information Technology" has been intensively introducing digitalization at the university. The university has a working group "Digit", which is developing a conceptual model of a digital university. The concept is based on a model of a digital university in the form of a pyramid, consisting of 4 faces that support platforms.

The first facet – "Digital architecture" – is a structural description of the equipment and software used for the business processes of a digital university.

The second facet – "Digital Services" – information management systems for a digital university and services for online support of the educational process.

The third facet is the "Digital Profile" – a space in which people with certain competencies and needs create their processes.

The fourth facet, the most resource-intensive, is the "Digital footprint" – an array of data on the results of all activities of the process participant [12].

Modern digital technologies are becoming a daily practice for regional universities as well. According to the Development Strategy of the Kazakh-American Free University (Ust-Kamenogorsk) for 2018–2022. the implementation of the SMART -University project is in progress. The transition to digitalization is indicated by changes in the organizational structure of the university, an additional center for "Digitalization and information support" has been introduced. At present, the center combines platforms and modules into a single system.

The center is working on creating a test server for approbation and testing of developments, redesigning and reorganizing the kafu.kz website in accordance with the requirements of the Ministry of Education and Science of the Republic of Kazakhstan and Webometrics, developing a KAFU repository, introducing a training platform – a video portal, automating the personnel management service. In addition, the domain name was registered and the corporate mail service was deployed in the kafu.edu.kz domain, the KAFU cloud service was expanded, and an access control system was introduced.

According to the "Program for the modernization of the material and technical base of KAFU for 2018–2022" in order to provide technical support for digital technologies, the LMS systems and platforms of the DOT of the university were improved:

1. The existing server for video streaming was modernized (the amount of RAM was increased to 64Gb, the disk raid array was increased to 8Tb);

2. Purchased NAS backup server for data protection QNAP D4 pro with 16Tb disk array;

3. Additional server for streaming video purchased;

4. A planetary library scanner was purchased to convert the library fund of the university into electronic format;

5. Equipment of the company Angekis for video-conferencing was purchased;

6. The Moodle platform has been updated to the current version 3.8;

7. The computer park was modernized;

8. The system of Wi-Fi wireless Internet access is expanded;

9. Every year there is a purchase of new educational, laboratory and multimedia equipment.

As part of the implementation of distance learning, a program of methodological seminars on the use of SMART-learning technology, e-learning technology, the development of electronic training courses, audio-video lectures is developed annually on the basis of the university. KAFU is also actively expanding its boundaries in the field of science and innovation, today it has 35 official agreements on cooperation with universities, educational and research organizations of the CIS countries, Europe and America. According to the plan for the 2021–2022 academic year, agreements on cooperation have been concluded, within the framework of which it is envisaged to deliver lectures and conduct practical classes by foreign teachers for KAFU students online.

Conclusion

The introduction of digital technologies into the higher education system will naturally make its own changes in the qualification requirements for the teaching staff and research workers of the university. Therefore, we must clearly understand that digitalization means not only technical innovations, financial resources, but also high-quality content and organization of educational activities, which in no way should harm the education system and, most importantly, not reduce the literacy level of students. All positions on the implementation of digital education should be reflected in the Strategy for the development of universities. The university should be proficient in the latest data analysis techniques that will open up new possibilities for understanding teaching processes. Digital education is a rather costly enterprise, and financing scientific projects for the digitalization of education from extra-budgetary funds carries huge risks for universities. Many experts agree that it is necessary to develop common standards and mechanisms for creating a methodology for digital transformation. One way or another, we are still at the beginning of the path towards universal digitalization, we still have a lot to do, and most importantly, in the pursuit of digital, innovative technologies, we do not forget about information security, which is an important accompanying component of this event.

REFERENCES

1 Report about Digital Economy 2021. International data flows and development: who is served by data streams. URL: https://unctad.org/system/files/official-document/der2021_overview_ru.pdf

2 The digital potential of the EDB member countries. June 2019. Center for Integration Studies. Eurasian Development Bank. URL: https://eabr.org/upload/iblock/551/EABR_Digital_Potential_06_2019.pdf

3 All statistics of the Internet and social networks for 2021 – numbers and trends in the world and in Russia. URL: https://www.web-canape.ru/business/vsya-statistika-interneta-i-socsetej-na-2021-god-cifry-i-trendy-v-mire-i-v-rossii

4 Digital Economy Report 2019. Value Creation and Benefits: Implications for Developing Countries. UN, Geneva, 2019. URL: https://unctad.org/system/files/official-document/der2019_overview_ru.pdf

5 Internet resource. News. URL:https://www.rspectr.com/novosti/63231/v-blizhajshie-15-25-let-cifrovaya-ekonomika-sostavit-50-ot-mirovogo-vvp

6 State program "Digital Kazakhstan". Approved by the Resolution of the Government of the Republic of Kazakhstan dated December 12, 2017, no. 827.

7 Digital Kazakhstan: what has changed in the country in a year. URL: https://kapital.kz/tehnology/83781/tsifrovoy-kazakhstan-chto-izmenilos-v-strane-za-god.html

8 The President instructed to revise the "Digital Kazakhstan". URL: https://profit.kz/news/57241/Prezident-poruchil-peresmotret-Cifrovoj-Kazahstan/

9 The most digital countries in the world: ranking 2020. URL: https://hbr-russia.ru/innovatsii/trendy/853688/

10 Science of Kazakhstan: current state, SWAT-analysis and digitalization of science. URL: https://www.ncste.kz/assets/files/tekushhee-sostoyanie-kazaxstanskoj-nauki.-15-08-2019-15-49-03.pdf

11 International Technopark of IT startups ASTANA HUB. URL: https://kazpatent.kz/sites/default/files//astana_hub_general_info_rus_0.pdf

12 How MUIT is transforming into a digital university. URL: https://forbes.kz/process/education/kak_muit_transformiruetsya_v_tsifrovoy_vuz/

И.В. БОРДИЯНУ,*¹
PhD, профессор РАЕ.
*e-mail: bordiyanuilona@mail.ru
Г.Ж. САРСЕМБАЕВА,¹
PhD, доцент.
e-mail: sgulnar10@mail.ru
А.Е. МАМБЕТКАЗИЕВ,¹
PhD, доцент.
e-mail: Kafu_ukg@mail.ru
¹Казахстанско-Американский свободный
университет, Казахстан, г. Усть-Каменогорск

ПРОБЛЕМЫ И ПЕРСПЕКТИВЫ РАЗВИТИЯ ЦИФРОВИЗАЦИИ В СФЕРЕ ОБРАЗОВАНИЯ И НАУКИ В УНИВЕРСИТЕТАХ НОВОГО ПОКОЛЕНИЯ

Аннотация

Цель статьи – рассмотреть вопросы внедрения цифровизации всех сфер общественной жизни, в особенности в области образования. Задачей внедрения цифровых технологий является ускорение темпов экономического развития любой страны, в частности Республики Казахстан, и вследствие этого улучшение благосостояния населения за счет использования информационно-коммуникативных технологий, а также обеспечение с минимальными издержками перехода экономики нашей страны на совершенно новую ступень развития. Казахстан взял курс на развитие цифровой экономики, это уже требование нового времени. В электронный формат страна стала переходить начиная с 2006 г., но основные препятствия, которые показали настоящую действительность, возникли с пандемией коронавирусной инфекции COVID–19 и объявлением карантина. На основе проведенного анализа авторы сделали вывод, что внедрение цифровизации идет медленными шагами. В нашей стране основная масса собственных производителей не спешит внедрять индустрию 4.0. не только в силу того, что это дорогое удовольствие, но и из-за отсутствия высококвалифицированных специалистов в данной области. Программа «Цифровой Казахстан» имеет некоторые недоработки, с учетом предыдущих ошибок вносятся корректировки, поэтому успешность ее реализации зависит от должного привлечения в процессы цифровизации всех субъектов экономической деятельности. Авторы уверены, что через развитие информационно-коммуникативных и цифровых технологий, создания благоприятной среды для обучения цифровым навыкам, оказания мер поддержки квалифицированным специалистам мы достигнем цели, обозначенной в программе «Цифровой Казахстан».

Ключевые слова: экономическое развитие, цифровизация, сфера образования и науки, университет, ресурсы, ЕАЭС, информационно-коммуникативные технологии.

И.В. БОРДИЯНУ, *¹
PhD, РҒА профессоры.
*e-mail: bordiyanuilona@mail.ru
Г.Ж. САРСЕМБАЕВА,¹
PhD, доцент.
e-mail: sgulnar10@mail.ru
А.Е. МАМБЕТКАЗИЕВ,¹
PhD, доцент.
e-mail: Kafu_ukg@mail.ru
¹Қазақстан-Америкаандық еркін университеті,
Қазақстан, Өскемен қ.

ЖАҢА БУЫН УНИВЕРСИТЕТТЕРІНДЕГІ БІЛІМ ЖӘНЕ ҒЫЛЫМ САЛАСЫНДА ЦИФРЛАНДЫРУДЫ ДАМЫТУДЫҢ МӘСЕЛЕЛЕРІ ЖӘНЕ ДАМУ КЕЛЕШЕГІ

Аңдатпа

Мақаланың мақсаты – қоғамдық өмірдің барлық салаларын, әсіресе білім беру саласын цифрландыруды енгізу мәселелерін қарастыру. Цифрлық технологияларды енгізудің міндеті – кез келген елдің, атап

айтқанда Қазақстан Республикасының экономикалық даму қарқынын жеделдету, сол арқылы ақпараттық-коммуникативтік технологияларды пайдалану есебінен халықтың әл-ауқатын жақсарту, сондай-ақ ел экономикасының цифрлық экономиканы құруды қамтамасыз ететін мүлде жаңа даму сатысына өтуін барынша аз шығынмен қамтамасыз ету. Қазақстан цифрлық экономиканы дамытуға бет бұрды, бұл жаңа уақыттың талабы. Ел 2006 жылдан бастап электронды форматқа ауыса бастады, бірақ нақты шындықты көрсеткен негізгі кедергілер COVID–19 коронавирустық инфекциясының пандемиясы және карантин жариялау кезінде болды. Жүргізілген талдау негізінде, авторлар цифрландыруды енгізу баяу қадамдармен жүріп жатыр деген қорытынды жасады. Біздің елімізде өз өндірушілерінің негізгі бөлігі 4.0. индустриясын енгізуге асықпайды, бұл қымбат қана емес, сонымен қатар осы салада жоғары білікті мамандардың болмауына байланысты. «Цифрлы Қазақстан» бағдарламасының кейбір кемшіліктері бар, алдыңғы қателерді ескере отырып, түзетулер енгізіледі, сондықтан оны іске асырудың табыстылығы цифрландыру процестеріне экономикалық қызметтің барлық субъектілерін тиісті түрде тартуға байланысты болады. Авторлар ақпараттық-коммуникативтік және цифрлық технологияларды дамыту, цифрлық дағдыларға оқыту үшін қолайлы орта құру, білікті мамандарға қолдау көрсету арқылы «Цифрлы Қазақстан» бағдарламасында белгіленген мақсаттарға қол жеткізетінімізге сенімді.

Тірек сөздер: экономикалық даму, цифрландыру, білім және ғылым саласы, университет, ресурстар, ЕАЭО, ақпараттық-коммуникативтік технологиялар.