МРНТИ 06.01.11
УДК 330
DOI 10.58319/26170493_2024_4_8

DIGITALIZATION OF KNOWLEDGE, IMPLEMENTATION OF IT TECHNOLOGIES IN EDUCATION

ZHUMAGULOVA A.B.[1]
Candidate of Juridical Sciences
YANOVSKAYA O.A.*[1]
Doctor of Economic Sciences, Professor
KYDYRMINA N.A.[1]
PhD
[1]Independent Agency for Accreditation and Rating, Astana, Republic of Kazakhstan

ABSTRACT. The article is dedicated to the development of digitalization in the education system in the context of modern trends, specifically focusing on the active integration of new technologies into the educational process. The study presents the current state of digitalization in the republic, its position in international rankings, and examines various approaches to digital transformation in education. It also provides specific examples of the implementation of digital technologies in higher educational institutions and explores limiting factors that negatively impact learning outcomes and knowledge assessment.

The purpose of the article is to assess the current state of digitalization in education based on an in-depth analysis and to identify key directions for shaping modern approaches to ensuring education quality in the era of new technologies and artificial intelligence development.

The main research methods include external assessment and analysis of educational services, comparative analysis, and theoretical and practical analysis in the context of digital transformation. These methods enable the identification of key directions for the development of digital education.

KEYWORDS: digitalization, digital skills, quality of education, artificial intelligence, new technologies, competitiveness, professional skills, expertise.

БІЛІМДІ ЦИФРЛАНДЫРУ, БІЛІМ БЕРУГЕ IT ТЕХНОЛОГИЯЛАРДЫ ЕНГІЗУ

ЖҰМАҒҰЛОВА А.Б.[1]
заң ғылымдарының кандидаты
ЯНОВСКАЯ О.А.*[1]
экономика ғылымдарының докторы, профессор
КЫДЫРМИНА Н.А.[1]
PhD
[1]Аккредиттеу және рейтингтің тәуелсіз агенттігі, Астана қ., Қазақстан Республикасы

АҢДАТПА. Мақала заманауи тенденциялар жағдайында білім беру жүйесіндегі цифрландыруды дамыту мәселелеріне арналған: білім беру үдерісіне жаңа технологияларды белсенді енгізу. Зерттеуде республиканың цифрландыру саласындағы қазіргі жағдайы мен оның халықаралық рейтингтегі орны талданады. Сондай-ақ, білім беру жүйесіндегі цифрлық өзгерістерге қатысты көзқарастар қарастырылып, еліміздің жоғары оқу орындарында цифрлық технологияларды енгізудің нақты мысалдары келтірілген. Сонымен қатар, білім нәтижелерін бағалауға теріс әсер ететін шектеуші факторлар да зерттелген.

Мақаланың мақсаты – терең талдау негізінде білімді цифрландырудың қазіргі жағдайын бағалау және жаңа технологиялар мен жасанды интеллектті дамыту аясында білім сапасын қамтамасыз етудің заманауи тәсілдерін анықтау.

Негізгі зерттеу әдістері – білім беру қызметін сыртқы бағалау мен талдау, салыстырмалы талдау, сондай-ақ цифрлық трансформация жағдайында теориялық және практикалық талдау әдістері. Бұл тәсілдер цифрлық білім беруді дамытудың негізгі бағыттарын анықтауға мүмкіндік береді.

ТҮЙІН СӨЗДЕР: цифрландыру, цифрлық дағдылар, білім сапасы, жасанды интеллект, жаңа технологиялар, бәсекеге қабілеттілік, кәсіби дағдылар, құзыреттер.

ЦИФРОВИЗАЦИЯ ЗНАНИЙ, ВНЕДРЕНИЕ IT-ТЕХНОЛОГИЙ В ОБРАЗОВАНИИ

ЖУМАГУЛОВА А.Б.[1]
кандидат юридических наук
ЯНОВСКАЯ О.А.*[1]
доктор экономических наук, профессор
КЫДЫРМИНА Н.А.[1]
PhD
[1]Независимое агентство аккредитации и рейтинга, г. Астана, Республика Казахстан

АННОТАЦИЯ. Статья посвящена вопросам развития цифровизации в системе образования в условиях современных трендов: активного внедрения новых технологий в образовательный процесс. В исследовании представлено современное состояние развития цифровизации республики и ее место в международном рейтинге, рассматриваются подходы цифровых изменений в области системы образования, приводятся конкретные примеры внедрения цифровых технологий в высшие учебные заведения страны, а также рассмотрены сдерживающие факторы, которые негативно отражаются на результатах и оценке знаний.

Цель статьи – на основе глубокого анализа дать оценку современному состоянию цифровизации знаний и определить направления формирования современных подходов к обеспечению качества образования в условиях новых технологий и развития искусственного интеллекта.

Основными методами исследования являются внешняя оценка и анализ образовательных услуг, сравнительный анализ, методы теоретического и практического анализа в условиях цифровых преобразований, которые позволили определить основные направления развития цифровых знаний.

КЛЮЧЕВЫЕ СЛОВА: цифровизация, цифровые навыки, качество образования, искусственный интеллект, новые технологии, конкурентоспособность, профессиональные навыки, компетенции.

INTRODUCTION. Nowadays, digitalization plays a special role in many industries. In today's day, technology is the most important tool for the development of all possible areas. In the field of education, digitalization improves and even simplifies the learning format.

Currently, digitalization is a widespread, cross-industry trend that enables:

- Economic growth through job creation and innovation;
- Improved quality of life thanks to labor and household automation;
- Social justice by expanding access to essential services such as healthcare, education, culture, and more.

In June 2023, President of Kazakhstan Kassym-Jomart Tokayev highlighted that Kazakhstan ranks 20th globally in terms of digitalization speed. According to the IMD 2023 ranking, Kazakhstan surpassed Italy and Turkey in digital competitiveness.

In 2024, Kazakhstan further strengthened its position in the global digital governance sphere. According to the UN E-Government Survey 2024, the country rose to 24th place among 193 nations, improving its ranking by four positions compared to the previous report. Today, according to the UN assessment, Kazakhstan continues to demonstrate progress in digitalization. The country is among the top 10 global leaders in the Online Services Index. Thanks to the implementation of digital technologies, Kazakhstani citizens can now easily and quickly obtain government documents and certificates.

Today, digital technologies play a significant role not only in daily life but also in education. IT technologies help all participants in the educational process make learning more effective — both at the institutional level and for independent study.

The future of the country fully depends on our ability to adapt to inevitable global digitalization. Therefore, a key factor in determining success in this process is the digitalization of education.

Lifelong learning is a crucial direction for development. The more educated people there are in society, the more advanced it becomes. Digitalization provides students with opportunities to deepen their knowledge. For instance, on their way to university or before going to bed, a student can use an app to enhance their skills. Online education offers well-structured integrated courses that allow learners to acquire high-quality knowledge.

It is now evident that the integration of new technologies into education not only makes learning more relevant to the modern world but also unlocks new opportunities for students in remote and hard-to-reach areas of Kazakhstan. The introduction of IT classrooms and internet access for children in rural

schools enables their graduates to compete equally for university placements alongside their urban counterparts.

Additionally, the digitalization of higher education allows university students in Kazakhstan to remain competitive in the global labor market while also contributing to the country's technological development.

MATERIALS AND METHODS OF RESEARCH. Internationally, scientific research on digital transformation has been conducted by scholars such as Alvin Toffler, who even expressed serious concerns about an overly techno-social future [1]. Klaus Schwab, in his academic works, defined the characteristics of the Fourth Industrial Revolution [2], while Eric Schmidt and Jared Cohen examined the consequences of digital culture formation [3]. David Kaplan, in turn, assessed the discouraging prospects of human intellectual labor [4].

A particularly noteworthy analytical review is that of E. Gable, who not only explores the outcomes of digital transformation in education across various countries but also highlights how digital solutions are integrated into modern pedagogical approaches and technologies. These include personalized learning, experiential learning, and phenomenon-based learning, all aimed at achieving modern educational outcomes [5].

Russian researchers, in their scientific articles, emphasize fundamental issues related to the digital future of public administration and the modernization of education in the digital age [6,7].

Studying international experience aligns with the conclusions of scholars I. Sidorchuk and A. Okhrimenko, who argue that the successful development of information infrastructure ensures the sustainability of digitalization processes within the education system [8].

As part of the "Digital Kazakhstan" state program, the government continues to invest in modernizing the education system. In the coming years, plans include expanding access to high-speed internet in schools and universities nationwide as well as developing new digital educational platforms. Particular attention will be directed to enhancing infrastructure in rural regions to bridge the digital divide and provide equal learning opportunities for all students. Digital literacy refers to the ability to use digital devices (such as personal computers and smartphones) to work with software applications for information search, analysis, exchange, and protection.

When training specialists today, the focus in education should shift from purely professional skills to meta-professional competencies. Professions in the past emphasized professional competencies, whereas future professions require a broader focus on soft skills. Key meta-professional competencies include communication skills, teamwork, robotics, and language proficiency.

In recent years, universities of Kazakhstan have actively adopted IT technologies and digitalized the educational process. This transformation spans several key areas such as mobile learning, cloud technology, online courses, gamification and web quest. In modern conditions, mobile learning technologies are the most in-demand in the education system.

1. **Establishment of Specialized Academies and Courses**. Thirty five universities host Huawei ICT Academies, offering certified courses by Huawei. Furthermore, with the support of Binance Kazakhstan, around 350 ICT faculty members from 22 universities received training in blockchain technologies [9].
2. **Development of Distance Learning**. Many Kazakhstani universities offer both in-person and remote learning options via digital platforms. This improves access to education for students from remote regions and allows them to combine studies with work [10].
3. **Digital Transformation of Infrastructure**. Universities are undergoing digital transformation, impacting not only the learning process but also technological and industrial platforms, laboratories, and workshops. Special emphasis is placed on developing artificial intelligence (AI) capabilities in regional universities [11].
4. **Collaboration with International Companies**. Universities in Kazakhstan have signed agreements with leading companies such as Coursera, Huawei Technologies Kazakhstan, and Binance Kazakhstan to introduce innovative learning technologies and expand educational opportunities [9].
5. **Research Projects on Digitalization**. Some universities are conducting AI-driven research in education and establishing technology laboratories to integrate digital solutions into the learning process [12].

These initiatives significantly improve the quality of education, making it more accessible and aligned with modern labor market demands.

For example, through collaboration with Coursera, students now have access to professional certificates, courses, and specializations in

cybersecurity, project management, UX design, and software development.

Originally, the project covered 25 universities, but within a year, it expanded to 93 higher education institutions. Blended learning and self-paced courses have been integrated into curricula.

In 2023, the Coursera platform replaced 116 university courses with 853 online courses, while 3,244 additional courses were partially integrated into 1,631 university subjects. Over 46,000 students obtained 73,000 certificates in various specialties.

Kazakhstan's faculty training program has already sparked interest among university professors. Over 300 educators have begun developing their own courses. The integration of AI into the learning process is also creating new opportunities to adapt content to local needs.

Additionally, the expansion of online courses and professional development programs will enable both students and professionals to acquire new skills and competencies, which is especially important in a rapidly evolving labor market.

Kazakhstan's digital transformation initiative in higher education serves as a strong example of how collaborative efforts between the government, educational institutions, and businesses can cultivate a workforce ready for the challenges of the future.

RESULTS AND THEIR DISCUSSION. Kazakhstan has undertaken extensive efforts to digitalize the process of education in universities. A new form of learning, online education has been introduced. Universities are transitioning to the smart university model, which involves the formation of a digital student profile, known as the "student life track," the development of digital EdTech services, and the optimization of processes in accordance with the latest digitalization trends.

IT education in Kazakhstan is undergoing active development. Annually, there are 20,000 IT students who are graduating in Kazakhstan. However, even this number does not meet the industry's demand. President Kassym-Jomart Tokayev noted that just two years ago, the global IT market required 30 million specialists. Today, this demand has increased to 100 million and is expected to reach 200 million by 2025. Clearly, this number will continue to grow over time.

Among the top educational institutions offering IT programs are:

- The International Information Technology University
- Almaty University of Power Engineering and Telecommunications named after G. Daukeyev
- Kazakh-British Technical University

These universities offer educational programs for specialists in cybersecurity, computer science, and other IT fields.

Overall, IT education in Kazakhstan has significant potential for growth and for attracting new professionals to the industry.

Over the past four years, the number of job vacancies in the professional field of "Information Technology, Internet, and Telecommunications" in Kazakhstan has increased by 88.5%.

The most in-demand IT specialists in Kazakhstan include: Programmers and developers, Designers, Analysts, System administrators, Technical support specialists, Information security specialists, System engineers, Testers, Network engineers, Game designers.

Additionally, Kazakhstani universities are planning to introduce educational programs in artificial intelligence technologies. For example, a seven-year program in collaboration with Seoul National University of Science and Technology will launch an AI School at Korkyt Ata Regional University. A second AI School is planned at Satbayev University with the support of City University of Hong Kong.

Several examples of digital technology applications in Kazakhstani universities have been highlighted in reports by external expert commissions (IAAR):

Narxoz University became the first institution in Central Asia to issue NFT diplomas. These diplomas contain graduate metadata stored and protected in a blockchain system, making them tamper-proof.

Shakarim University has a Jalinga video recording studio, enabling the creation of video instructions, lectures, and online lessons. This studio is highly technological yet user-friendly, requiring no operator. It allows the use of internet sources, interactive elements, and transparent touchscreen boards for content placement.

This is an innovative product that aligns with current digitalization trends. Lectures will be streamed live, and students will be required to take tests upon completion. This university was the first in Kazakhstan to acquire such advanced equipment, allowing students to watch video courses and receive automatic assessments after completing tests.

Based on an analysis of IAAR EEC reports from 2023-2024, several general recommendations

have been provided for universities regarding IT integration and digitalization:

1. **Develop and Implement a Digitalization Strategy**: Universities should formulate a long-term digital transformation strategy, including infrastructure modernization, adoption of advanced educational technologies, and cybersecurity measures.
2. **Enhance Faculty Qualifications**: Regular training sessions should be conducted for faculty on utilizing digital tools and online platforms in education.
3. **Develop and Expand Online Courses**: Universities should create their own online courses and programs while collaborating with international platforms to broaden student learning opportunities.
4. **Implement Learning Management Systems (LMS)**: Modern LMS platforms should be used for organizing the learning process, tracking academic performance, and facilitating online interactions with students.
5. **Ensure Access to Digital Resources**: Universities should provide students and faculty with access to electronic libraries, scientific databases, and other digital educational resources.
6. **Improve Infrastructure**: This includes upgrading computer labs, ensuring high-speed internet access across campuses, and creating an environment conducive to effective IT use in education.
7. **Feedback and Monitoring**: Regular student and faculty surveys should be conducted to evaluate the effectiveness of implemented IT solutions and optimize them for better education management.

These recommendations aim to enhance the quality of education, strengthen the digital component in academic programs, improve faculty and administration expertise in modern technologies, and better prepare students for the digital economy.

CONCLUSION. The digitalization of education in Kazakhstan opens new perspectives for the country's educational system. The implementation of modern technologies and digital platforms improves the quality of learning, making it more accessible and flexible. However, for more successful digitalization existing challenges such as digital inequality and insufficient teacher training must be addressed, requiring further efforts from the state and society.

In modern education, both in Kazakhstan and globally, two major problems persist:

- A significant disparity in educational quality between schools
- A lack of personalized learning approaches

These issues are difficult to resolve without digital platforms and services.

At the heart of any digital transformation should be the individual and their personalized experience — in the case of universities, the student and their learning journey. Digitalization in education is not merely about automating accounting, electronic passes, or digitizing lessons. It is about expanding students' learning opportunities through 24/7 access to knowledge, personalized education, and community-based communication.

For successful educational reform, conditions must be created in five key areas:

- Redesigning university management;
- Retraining faculty;
- Developing digital infrastructure;
- Implementing new student assessment technologies;
- Integrating additional education opportunities;

The future of education is closely linked to artificial intelligence and online learning. Discussions focus on AI applications in university campuses, adaptive technologies, and personalized education. Topics such as Big Data, experiential and immersive learning for staff, and EdTech innovations are gaining traction. The integration of AI can enhance education by eliminating grading bias, assisting both teachers and students, and increasing motivation for learning.

The primary goals for Kazakhstan's higher education and research sectors are directed towards a technological breakthrough for the country through digitalization, science, and innovation. To achieve this, a sustainable workforce system will be established, lifelong learning concepts will be implemented, and Kazakhstan's integration into the global scientific and educational landscape will be ensured through academic excellence.

Ultimately, successful adaptation to the digital era will be a key factor not only in ensuring high-quality education but also in securing Kazakhstan's prosperity and global competitiveness.

REFERENCES:

1. Toffler, Je. (2002). *Shok budushhego* [Future Shock]. M.: «Izdatel'stvo ACT». [in Russian]
2. Shvab, K. (2016). *Chetvertaja promyshlennaja revoljucija* [The Fourth Industrial Revolution]. Jeksmo. ISBN 978-5-699-90556-0

[in Russian]

3. Shmidt, Je. & Kojen, Dzh. (2013). *Novyj cifrovoj mir. Kak tehnologii menjajut zhizn' ljudej, modeli biznesa i ponjatie gosudarstva* [The New Digital World: How Technologies Are Changing People's Lives, Business Models, and the Concept of the State]. M.: Mann, Ivanov i Ferber. [in Russian]

4. Kaplan, J. (2015). *Humans need not apply: A guide to wealth and work in the age of artificial intelligence.* New Haven, CT: Yale University Press.

5. Gjejbl, Je. (2019). *Cifrovaja transformacija shkol'nogo obrazovanija. Mezhdunarodnyj opyt, trendy, global'nye rekomendacii.* [Digital Transformation of School Education. International Experience, Trends, Global Recommendations]. M.: NIU VShJe. [in Russian]

6. Klochkova, E.N. & Sadovnikova, N.A. (2019). Transformacija obrazovanija v uslovijah cifrovizacii [Transformation of education in the context of digitalization]. *Otkrytoe obrazovanie - Open education, 4,* 13-22. [in Russian]

7. Dobroljubova, E.I., Juzhakov, V.N., Efremov, A.A., Klochkova, E.N., Talapina, Je.V. & Starcev, Ja.Ju. (2019). *Cifrovoe budushhee gosudarstvennogo upravlenija po rezul'tatam* [The digital future of public administration based on results]. M.: Izdatel'skij dom «Delo» RANHiGS. [in Russian]

8. Sidorchuk, I.P. & Ohrimenko, A.A. (2022). Zarubezhnyj opyt kak osnova jeffektivnogo vnedrenija innovacionnyh tehnologij i cifrovizacii sistemy obrazovanija. [Foreign experience as a basis for the effective implementation of innovative technologies and digitalization of the education system]. *Sovremennye tendencii v dopolnitel'nom obrazovanii vzroslyh: sb. materialov VI Mezhdunar. nauch.-metod. konf. Minsk: RIVSh* [Modern trends in additional education of adults: collection of materials of the VI International scientific and methodological conf. Minsk: RIVSh], 343-349. [in Russian]

9. Profit.kz (2024, August 15). *Kazahstanskie vuzy prohodjat cifrovuju transformaciju* [Kazakhstani universities undergo digital transformation]. https://profit.kz/news/68060/Kazahstanskie-vuzi-prohodyat-cifrovuu-transformaciu/?utm_source=chatgpt.com [in Russian]

10. Bilim Shagaty. (2024). *Cifrovizacija obrazovanija v Kazahstane: shagi k modernizacii* [Digitalization of Education in Kazakhstan: Steps to Modernization]. https://bsh.kz/cifrovizacija-obrazovanija-v-kazahstane-shagi-k-modernizacii [in Russian]

11. ElOrdaInfo. (2024). *Cifrovuju transformaciju vuzov sozdadut v Kazahstane* [Digital transformation of universities will be created in Kazakhstan]. https://ru.elordainfo.kz/sotsium-ru/czifrovuyu-transformacziyu-vuzov-sozdadut-v-kazahstane [in Russian]

12. Nartaeva, A. (2024). *Kak cifrovizacija i tehnologii menjajut sferu obrazovanija v Kazahstane* [How digitalization and technology are changing the education sector in Kazakhstan]. https://baigenews.kz/kak-tsifrovizatsiya-i-tehnologii-menyayut-sferu-obrazovaniya-v-kazahstane_300001085 [in Russian]

13. Zhumagulova, A. &Yanovskaya, O. (2024). New paradigm for ensuring the quality of education. *Education. Quality Assurance, 3(36)*, 9-13.

СВЕДЕНИЯ ОБ АВТОРАХ:

Zhumagulova Alina - Candidate of Juridical Sciences, General Director, Independent Agency for Accreditation and Rating (IAAR), Astana, Republic of Kazakhstan
E-mail: iaar@iaar.kz
Yanovskaya Olga* - Doctor of Economic Sciences, Professor, PhD, Academician, Advisor to the General Director, Independent Agency for Accreditation and Rating (IAAR), Astana, Republic of Kazakhstan
E-mail: yanovskaya_o@mail.ru
Kydyrmina Nurgul - PhD, Manager of Information and Analytical Project, Independent Agency for Accreditation and Rating (IAAR), Astana, Republic of Kazakhstan
E-mail: nurgul@iaar.kz

Жұмағұлова Алина Бақытжанқызы - заң ғылымдарының кандидаты, бас директор, Аккредиттеу және рейтинг тәуелсіз агенттігі (IAAR), Астана қ., Қазақстан Республикасы E-mail: iaar@iaar.kz
Яновская Ольга Алексейқызы* - экономика ғылымдарының докторы, профессор, академик, бас директорының кеңесшісі, Аккредиттеу және рейтингтің тәуелсіз агенттігі (IAAR), Астана қ., Қазақстан Республикасы
E-mail: yanovskaya_o@mail.ru
Кыдырмина Нургуль Алимовна - PhD, ақпараттық-талдау жобасының жетекшісі, Аккредиттеу және рейтингтің тәуелсіз агенттігі (IAAR), Астана қ, Қазақстан Республикасы
E-mail: nurgul@iaar.kz

Жумагулова Алина Бакытжановна - кандидат юридических наук, генеральный директор Независимого агентства аккредитации и рейтинга (IAAR), г. Астана, Республика Казахстан E-mail: iaar@iaar.kz
Яновская Ольга Алексеевна* - доктор экономических наук, профессор, академик, Советник генерального директора, Независимое агентство аккредитации и рейтинга (IAAR), г. Астана, Республика Казахстан
E-mail: yanovskaya_o@mail.ru
Кыдырмина Нургуль Алимовна - PhD, руководитель информационно-аналитического проекта, Независимое агентство аккредитации и рейтинга (IAAR), г. Астана, Республика Казахстан
E-mail: nurgul@iaar.kz