ISSN 2518-1467 (Online),
ISSN 1991-3494 (Print)

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ

Х А Б А Р Ш Ы С Ы

ВЕСТНИК

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН

THE BULLETIN

THE NATIONAL ACADEMY OF SCIENCES
OF THE REPUBLIC OF KAZAKHSTAN

PUBLISHED SINCE 1944

2

MARCH – APRIL 2021

ALMATY, NAS RK

NAS RK is pleased to announce that Bulletin of NAS RK scientific journal has been accepted for indexing in the Emerging Sources Citation Index, a new edition of Web of Science. Content in this index is under consideration by Clarivate Analytics to be accepted in the Science Citation Index Expanded, the Social Sciences Citation Index, and the Arts & Humanities Citation Index. The quality and depth of content Web of Science offers to researchers, authors, publishers, and institutions sets it apart from other research databases. The inclusion of Bulletin of NAS RK in the Emerging Sources Citation Index demonstrates our dedication to providing the most relevant and influential multidiscipline content to our community.

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«Қазақстан Республикасы Ұлттық ғылым академиясының Хабаршысы».

ISSN 2518-1467 (Online),
ISSN 1991-3494 (Print)

Меншіктенуші: «Қазақстан Республикасының Ұлттық ғылым академиясы»РҚБ (Алматы қ.).

Қазақстан Республикасының Ақпарат және коммуникациялар министрлігінің Ақпарат комитетінде 12.02.2018 ж. берілген **№ 16895-Ж** мерзімдік басылым тіркеуіне қойылу туралы куәлік.

Тақырыптық бағыты: ***іргелі ғылымдар саласындағы жаңа жетістіктер нәтижелерін жария ету.***

Мерзімділігі: жылына 6 рет.
Тиражы: 300 дана.

Редакцияның мекен-жайы: 050010, Алматы қ., Шевченко көш., 28, 219 бөл.,
тел.: 272-13-19, 272-13-18

http://www.bulletin-science.kz/index.php/en/

Типографияның мекен-жайы: «Аруна» ЖК, Алматы қ., Муратбаева көш., 75.

«Вестник Национальной академии наук Республики Казахстан».

ISSN 2518-1467 (Online),
ISSN 1991-3494 (Print)

Собственник: РОО «Национальная академия наук Республики Казахстан» (г. Алматы).

Свидетельство о постановке на учет периодического печатного издания в Комитете информации Министерства информации и коммуникаций и Республики Казахстан **№ 16895-Ж**, выданное 12.02.2018 г.

Тематическая направленность: ***публикация результатов новых достижений в области фундаментальных наук.***

Периодичность: 6 раз в год.
Тираж: 300 экземпляров.

Адрес редакции: 050010, г. Алматы, ул. Шевченко, 28, ком. 219, тел. 272-13-19, 272-13-18

http://www.bulletin-science.kz/index.php/en/

Адрес типографии: ИП «Аруна», г. Алматы, ул. Муратбаева, 75.

Bulletin of the National Academy of Sciences of the Republic of Kazakhstan.

ISSN 2518-1467 (Online),
ISSN 1991-3494 (Print)

Owner: RPA "National Academy of Sciences of the Republic of Kazakhstan" (Almaty).

The certificate of registration of a periodical printed publication in the Committee of information of the Ministry of Information and Communications of the Republic of Kazakhstan No. **16895-Ж**, issued on 12.02.2018.

Thematic focus: ***publication of the results of new achievements in the field of basic sciences.***

Periodicity: 6 times a year.
Circulation: 300 copies.

Editorial address: 28, Shevchenko str., of. 220, Almaty, 050010, tel. 272-13-19, 272-13-18

http://www.bulletin-science.kz/index.php/en/

Address of printing house: ST "Aruna", 75, Muratbayev str, Almaty.

BULLETIN OF NATIONAL ACADEMY OF SCIENCES
OF THE REPUBLIC OF KAZAKHSTAN
ISSN 1991-3494
Volume 2, Number 390 (2021), 281 – 288 **https://doi.org/10.32014/2021.2518-1467.82**

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DIGITAL EDUCATION AND DEVELOPMENT

Abstract. The education system is gradually getting changed according to the advancement of digital technologies and due to the global increase in the influence of the Internet, the role of e-learning has grown significantly in recent years. The purpose of this study is to analyse education to the social development (development of science, industry and communities worldwide) and to identify gaps in e-learning in the context of training tasks for science and industry. The authors offer the Triple Helix model as a key aspect of education. This approach to education offers value for all model components and, in terms of education, facilitates overcoming deficiencies of traditional education; It also enables to development of human beings, to develop a person as a subject of his own life and development, as a professional and a subject of the production process, and as a subject of science and the developed community as a whole. Methodology: In this paper, the Triple Helix model is presented as the suitable method for collaboration among Universities-Industry-Government, with the overall objective to promote online education in higher educational institutions. Findings: The research identified that online education with a certain way of organizing it, fosters collaborative work which develops students' key skills such as communication skills, creative thinking, critical and systematic thinking, analytical skills, and cognitive abilities. Contributions: This study contributes to theory development of education and some ideas for further research in order to develop human beings in the society of today and tomorrow. Recommendations are given in an economy with low absorption potential. Authors highlighted that harmonization of relations between education, science and industry is an important condition for the modernization of human life.

Keywords: education, e-learning, model, industry, university, innovation, digital, teachers.

Introduction. Digitalization in educational sciences from the historical perspective has a huge effort of pioneers. Educators and e-learning creators are attempting to improve e-learning and e-teaching to achieve an effective result in education and to prepare competent specialists in the society of today and tomorrow; some European educational institutions from eight countries such as Great Britain, Ireland, Portugal, Spain, Greece, Finland, Cyprus, and the Czech Republic conducted a research work on Open and Distance Learning Network for Exchange Experiences to clarify its theoretical base. The project purpose was to exchange experiences among e-learners, e-teachers, and e-programmers of new forms of study (Berikkhanova, et al, 2017; Bordianu, 2011; Parker, Tazhina, 2013). However, recreation of the traditional didactics plays a crucial role in the digital age towards the engineering of learning. For instance, laboratory experiments can not be conducted in virtual environments (Panichkin et al., 2020; Kuldeev et al., 2020; Kenzhaliev et al., 2019a/b; Volodin et al., 2020; Beisembetov et al., 2015; Zhapbasbayev et al., 2016). E-learning materials are well adapted in the humanitarian sciences such as linguistics and pedagogy (Fauzi et al., 2020; Kassymova et al., 2019, 2018; Atayeva et al., 2019; Gasanova et al., 2020; Akhmetova et al., 2020).

Another research work is being conducted by a German Heidelberg University of Education. Digital education should start at higher education but not in schools. For this reason, Heidelberg University of Education has anchored the area of digitalization as a central task directly in the rectorate and given the appropriate space in the current structure and development plan. Since June 2019, the university has been the first university of teacher education in Germany to adopt a "Strategy for an educational science

university in an increasingly digital world". The aim is to research how digitalization is used in the context of education, to design its teaching accordingly in an innovative way and to transfer its expertise to society (Flindt and Ritter, 2020),

At the moment, the distance format is a new option in the field of higher education. Its popularity and relevance will depend on a number of factors: on the availability of the Internet in the regions of our country, on the university positioning of the distance learning format, on the political and economic situation in country, and on other factors. There is currently no information on the quality of distance learning. The effectiveness of distance learning can be measured in 10 - 20 years. The new training format carries both opportunities and limitations (Pekker, 2015).

Distance education in Kazakhstan is not particularly widespread, however, it is gaining more and more popularity every year. Already today, a number of universities in Kazakhstan offer distance education (Dalayeva, 2013; Kerimbayev, 2012; Nurgaliev, Syrymbetova, 2013; Nurgalieva, 2013; Spirina et al., 2013; Yessenova et al., 2020). For instance, one of the leading technical research universities is Satbayev University who provides the opportunity to study at a remote distance by using e-learning materials. This institute was established in 2004 as the Center for Distance Learning at the Institute of Information Technologies. In 2015, the university became an honorary member of the European Association of Global Universities in Distance Education in Rome, Italy. Like in Germany, in Kazakhstan distance education is available in higher educational settings. According to the latest information, 71 universities represent distance learning in Kazakhstan[1]. Despite the fact that contributions are being done by researchers and educators in the e-learning system, there is still a gap in online education. In the following section, we review the digital education system results in higher education.

E-learning or digital learning at the university takes an important place in the training of specialists who can work effectively and efficiently in the field of science and industry for the benefit of the community. However, it is important to understand what this place is like. It is important not to overestimate and underestimate the role of e-learning in the development of science and industry, as well as society as a whole (Amoore, & Piotukh, 2016; Loh, 2018). The main aspects and related problems of digital learning in the context of the development of science and industry are related to the fact that:

1) Digital training of future specialists, as well as specialists undergoing retraining and advanced training at a university, with its high-quality and metered organization, an important addition to traditional classroom training, it can significantly enrich the content and methodological base of education, that is, significantly affect quality improvement training and retraining of specialists.

2) Digital education, with its low-quality and excessive exploitation, can destroy education, sharply reducing the quality of training and retraining of specialists (Danaev et al., 2014; Kenzhebayev, Dalayeva, 2014; On Education, 2018; Parker, Tazhina, 2013; Yessenova et al., 2020).

3) Throughout the modern world (Welzer, 2016), including Kazakhstan (Berikkhanova, et al, 2017; Bordianu, 2011; Danaev et al., 2014; Kenzhebayev, Dalayeva, 2014; Parker, Tazhina, 2013; Yessenova et al., 2020), digital learning is actively promoted, but it faces problems of technological and, most importantly, methodological support (the most relevant and problematic are the issues of psychological, axiological, ergonomic plans).

4) As numerous publications show, the problems of digital learning in Kazakhstan are expressed no less sharply than in the whole world (Dalayeva, 2013; Kassymova, et al., 2019c; Kerimbayev, 2012; Nurgaliev, Syrymbetova, 2013; Nurgalieva, 2013; Spirina et al., 2013).

5) The use of digital technologies in the training of specialists for science should be focused on supporting the formation and development of research abilities and readiness (competencies) of a specialist. Such competencies are formed among students of master's degrees, postgraduate studies, and, to a lesser extent, bachelor's degree. Thus, digital learning in the training of future scientists and the use of digital technologies in the work of scientists is part of a special stage of education, and, moreover, a specific area of training, which is not always singled out as a separate task. Now the training of young scientists in many countries, including Kazakhstan, is happening sporadically and accidentally rather than purposefully. (Berikkhanova, et al, 2017; Bordianu, 2011; Carr-Chellman, and Duchastel, 2000; Danaev et al., 2014; Hinchliffe, 2001; Kenzhebayev, Dalayeva, 2014; Lavrinenko V., et al., 2019; Parker, Tazhina, 2013; Yessenova et al., 2020).

[1] Read more: https://www.nur.kz/1720482-distancionnoe-obucenie-v-kazahstane-spisok-vuzov.html

6) When training industry specialists, the leading points are to ensure access of the future specialist to the traditional and modern knowledge and skills, models and technologies of production that he needs, along with information about the prospects for the development of industry, including its technological, managerial, socio-psychological and axiological aspects. Obviously, modern programs are more focused on providing the future specialist with information about the technological aspects of professional work, but they ignore the axiological, managerial and socio-psychological aspects.

7) A separate issue is the development by young specialists of science and industry of digital technologies, programs, etc., created for scientists and industrial workers (Aoun, 2017).

8) Scientists consider existing in this context issues mainly within the framework of declarations of the importance of digital learning and its prospects. The substantive aspect of the problem posed by us remains unsolved. Our previous studies indicate, however, that a deep meaningful development of the problem is needed (Arpentieva, 2018a; Kassymova et al, 2018; Kassymova et al, 2019a; Minghat et al., 2020; Kassymova et al, 2019b).

The triple helix model for solving the issue we are considering was chosen because the development of education, science and industry is a single synergistic process in which there is a constant exchange of information and technologies, which needs not only de facto comprehension, but also substantive development and intensification. H. Etzkowitz (2008), describing the Triple Helix: University-Industry-Government Innovation model, believes that only when education, industry and science work as a single complex (including under state control), stable real progress is possible community. Digital learning should be part of the work of universities and other vocational education institutions, part of scientific research and industrial technology, as well as part of local and public administration of universities, science and industry. This is the main hypothesis of our research.

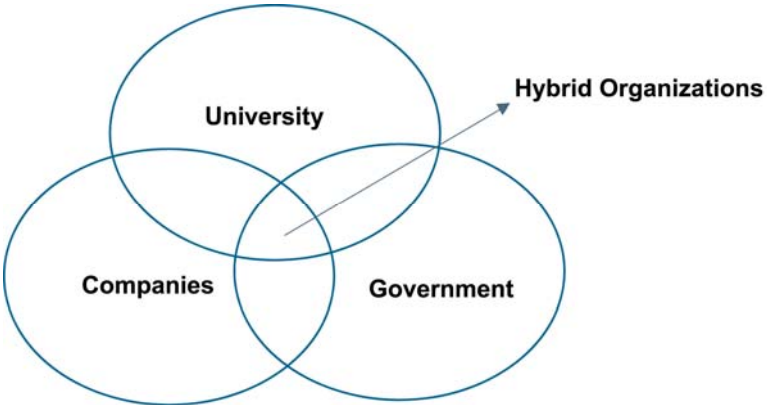
The research methodology and purpose of the study. The purpose of our research is to highlight the contribution of education to the development of science, industry and communities.

The research methodology is based on the principle of systematic analysis of the problem. The work is predominantly theoretical in nature, focused on critical understanding of the problems and prospects of digital education at the university as a factor of social development, primarily in such areas as science and industry. We highlight the existing lines of research and their critical review to highlight the main research trends and underlying problems. In this sense, our research is meta-analytical. Our research is of a projective nature: we outline the contours of further theoretical and empirical study of the problem. For these purposes, a theoretical study and primary collection of empirical data are carried out.

The importance of the research results is associated with the development of the author's model for the interaction of digital technologies in education, science and industry. The practical significance of the study is associated with the search for new areas of interaction between industry and education under the guidance of science, with the development of areas for improving education and its digital components in the university, as well as in industry and science.

Helix models in the society. As in the previous subsection, we have mentioned that employers still suspect the quality of online education. In order to solve this issue, we suggest organizing online education based on the famous triple helix model (university, industry, and government).

With the transition from industrial to the digital era, the competitiveness of employment has started depending on the access and possibility to use relevant knowledge, competences, andskills of employee's knowledge. Traditional disciplinary professions were surpassed by a cross-disciplinary approach. Consequently, the preferred skills of workers were highlighted by employers, such as intensive collaboration and communication skills, creative thinking, critical and systematic thinking, analytical skills (Cvetković et al., 2017), and cognitive competence (Kassymova, et al., 2019). However, the traditional education system was failing to shape graduates with described competences and skills. As a response to that, the online education system provides many opportunities to collaborate and to combine education and industry; and additional support is needed from the government in order to enable workers to advance their knowledge by online education. Engagement on real-world projects and complex problem-solving has proved to be valuable for the transition of students into successful knowledge workers. In order to facilitate these initiatives, the Triple Helix model (figure), with the presented defined role ofall the components (Universities, Industry, and Government), their relationship (Networking) and functions inside the model is recommended (Cvetković et al., 2017). This model represents valuable support for online education.



Triple Helix Model (De Almeida Borges et al., 2020)

Within the framework of Triple Helix Model, interdisciplinary attainments are generated made by interdisciplinary teams united for a short time to work on a specific problem of the real world. During this period of the Triple Helix concept, as it can be seen from the Figure 1, hybrid organizations such as incubators, technology parks and venture capital firms, elements of the national system of innovation can be created by the interaction between universities, companies and governments (Etzkowitz, 2008; De Almeida Borges et al., 2020). This process may lead to effective outcomes of the whole educational system. We propose, however, to slightly adjust the triple helix model: in the triad "industry, university and government", we replace the last component with "science". In our opinion, science is a more long-term and important aspect of the management of industry and education than the state. The state, by virtue of its mission, exerts an intensive external influence on the development of technologies, including digital ones, in education and industry. However, science provides development management "from within" the community. These are the realities of the informational and post-informational stage of the development of civilization. The role of government now in many countries is increasingly reduced to comprehending scientific achievements and concepts of community development: this is evidenced by the models of "sustainable development", "technological orders", etc.

Research results and discussion. In fact, everyone should do their own thing, and do it professionally, informatively, efficiently, and not formally and “in between”. Moreover, cooperation focused on the development of man and humanity is very important. “Human capital” is qualitatively different, different from financial and material capital: it cannot be scattered among banks (industrial zones — concentration camps), depriving a person of not only independence, but also self-awareness. However, modern foresights are largely meaningless because they ignore the layers of methods and theories of training and education accumulated over the centuries, reducing it to the simplest models. Education as one of the most difficult areas of human activity requires people with a vocation, people who see the productivity and effectiveness of their work. Education is the duty of the present generation to the future. Without glorifying the future, but with responsibility and care for children, grandchildren and great-grandchildren, people need to clearly understand: what they pass on to their descendants, what “debt” they pay to their ancestors and whether they pay it.

An alternative to the “official”, “greenfield” foresight of education, the development of its future, including with respect to digital education, includes “reanimation”, restoration of the cultural and moral foundations of education, including ethnopedagogical rights. Practitioners and theorists do not need to try to reverse the changes and go back: the main line of transformation in the transition to a new “technological” structure is not just a much more sophisticated exploitation of man and society as “capital”, to which the bourgeois-colonial world of the West is used, but the priority of these types of "capital" in themselves. The concept of “capital” still has a consumer model of attitude towards people, but in reality, a person should be the goal and value of education, production, state activity, and not vice versa. It is not education that should serve the interests of corporations and the state, as some illiterate researchers who do not know either their own or those of others in pedagogy and psychology believe, but corporations are the interests of people, of humanity.

N. Carr's and J. Danaher critiques of the rise of digitalization and automation is entitled '"the degeneration effect'": it consists the effects of automation on the quality of decision-making (the outputs of decision-making), and the effects of automation on the complexity of human thought. In modern technologies a computer algorithm takes over a decision-making function that was once performed by a human being (Carr 2014). There is question: does automation always succeed in realizing benevolent aims? It frequently does not: most people adhere to something called the 'substitution myth': the nature of the activity loop does not fundamentally change through the process of automation. But the automated component of the loop a radically different way and changes both other elements, stages, and the result of the loop, it changes the behavior of the humans. there is the automation complacence: people afford too much weight to comfort, they allowing the technologies to take complete control. There is such a cognitive fallacy as automation bias: people place a high value on the evidence and recommendations of the computer. This suggests that digital technologies in education, science and production require the development of methodological approaches to their use, verification and correction of their data, processes and results of the work (Danaher, 2015). A person should not refuse to manage his life, trusting all computers. The automation complacency and automation bias can lead to mistakes. The automation has deleterious effects for the degeneration of their cognitive functioning.

Digital security in the modern world arose not only because there is no culture of relationships in the digital environment. It arose because moral, conventional ritual and legal norms both in the real and in the "virtual" world ceased to be real regulators of relations. The real regulators in this environment are the norms of the community that modifies all aspects of its existence. The challenge for teachers, administrations, the state is to restore education as the best education in the world, restore circulation as a sphere of culture, not business, reorient education to develop personality and culture, and not serve even the best "direct" needs of production and economics, really complicated. Morally meaningful and based on moral standards, participatory, developing technologies education, however, is not an unattainable future, but a developed tradition, which researchers and teachers are ready to support and restore.

The challenge facing teachers, administrations, and the state is to restore domestic education as the best education in the world, restore circulation as a sphere of culture, not business, reorient education to the development of personality and culture, and not serve even the best "direct" needs of production and the economy, really complicated. Morally meaningful and based on moral norms, participatory, technology-developing education, however, is not an unattainable future, but a developed tradition, which researchers and teachers are ready to support and restore (Arpentieva, 2018b; Kassymovaea al., 2018). The main condition is not to prevent them from fulfilling their duties, overloading their lives with the need to deal with quasi-business issues, which are actively imposed in the process of trade in "educational services" to the detriment of the practice of training and education as a process of socio-cultural reproduction and development of society. Thus, the innovative potential of a nation depends not only on individual participants in the innovation system (companies, universities, government), but, more importantly, on the links between these players and on educational system, personal development (Arpentieva et al., 2019). Delivery of education should be connected with the real industry workforce and applied science. Thus, knowledge will be a great value of importance in the future.

Conclusion. At the present stage, humanity is learning to live with technologies that, as it sometimes seems, are capable of completely absorbing a person and blocking his development. The end result will depend on what hands the technologies are in, and for what purposes they are used, how competently the relationships of people with technologies and digital devices are built. The state may try to solve this problem, but the main contribution to its solution is made by the people themselves: their desire or unwillingness to learn, including learning how to learn by using digital technologies. The development of education, science and industry is a synergistic process in which there is a constant exchange of information and technologies between different aspects of the life of the community. Only when education, industry and science work as a single complex, stable real progress of the community is possible. Digital learning should be part of the work of universities and other vocational education institutions, part of scientific research and industrial technology, and part of local and state governance of universities, science and industry.

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ЦИФРЛЫҚ БІЛІМ ЖӘНЕ ДАМУ

Аннотация. Сандық технологиялардың дамуына сәйкес білім беру жүйесі біртіндеп өзгеріп отырады және ғаламтордың ықпалының әлемдік артуына байланысты электронды оқытудың рөлі соңғы жылдары едәуір өсті. Бұл зерттеудің мақсаты - әлеуметтік дамуға (бүкіл әлем бойынша ғылымның, өндірістің және қоғамдастықтардың дамуына), білім беруді талдау және ғылым мен өндірісті оқыту міндеттері тұрғысынан электронды оқытудағы олқылықтарды анықтау. Авторлар білім берудің негізгі аспектісі ретінде Triple Helix моделін ұсынады. Бұл білім беру тәсілі барлық модель компоненттері үшін құндылық ұсынады және білім тұрғысынан дәстүрлі білім берудің кемшіліктерін жоюға ықпал етеді; Ол сонымен қатар адамның дамуына, адамның өмірі мен дамуының субъектісі ретінде, кәсіпқой ретінде, өндіріс процесінің субъектісі ретінде, ғылымның субъектісі ретінде және дамыған қоғамдастық ретінде дамуына мүмкіндік береді. Бұл жұмыста үштік спираль моделі жоғары оқу орындарында онлайн-білім беруді алға жылжыту мақсатымен университеттер-индустрия-үкімет арасындағы ынтымақтастық үшін қолайлы әдіс ретінде ұсынылған. Ғаламтордағы білім оны ұйымдастырудың белгілі бір тәсілімен бірлесіп жұмыс істеуге ықпал ететіндігі анықталды, бұл студенттердің коммуникативті дағдылар, шығармашылық ойлау, сыни және жүйелі ойлау, аналитикалық дағдылар мен танымдық қабілеттер сияқты негізгі дағдыларын дамытады. Бұл зерттеу білім беру теориясының дамуына, қазіргі және ертеңгі қоғамдағы адамдарды дамыту мақсатында қосымша зерттеулерге арналған бірнеше идеяларға ықпал етеді. Мақалада зерттеуге байланысты ұсыныстар беріледі. Авторлар білім, ғылым және өндіріс арасындағы қатынастарды үйлестіру адамзат өмірін модернизациялаудың маңызды шарты екенін атап өтті. Авторлар сандық білім берудің артықшылықтары мен кемшіліктерін, оның түрлері мен әдістерін асығыс және негізінен біржақты зерттеуді көріп отыр, бірақ ғалымдар мен оқытушылар үшін сандық білім берудің әдістері мен технологияларын дамыта бастайтын уақыт келеді. Автолардың болжамы бойынша сандық технологиялар білім беру жүйесін өзгертеді.

Түйін сөздер: білім, электронды оқыту, модель, индустрия, университет, инновация, цифрлық, мұғалім.

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ЦИФРОВОЕ ОБРАЗОВАНИЕ И РАЗВИТИЕ

Аннотация. С развитием цифровых технологий система образования постепенно меняется, и роль электронного обучения в последние годы значительно выросла из-за растущего влияния Интернета. Целью данного исследования является анализ образования в интересах социального развития (развития науки, промышленности и сообществ во всем мире) и выявление пробелов в электронном обучении с точки зрения целей науки и промышленного образования. Авторы предлагают модель Тройной спирали в качестве ключевого аспекта образования. Такой образовательный подход обеспечивает ценность для всех компонентов модели и помогает преодолеть недостатки традиционного образования с точки зрения образования. Это также позволяет человеческое развитие, развитие человека как субъекта его жизни и развития, как субъекта профессиональных и производственных процессов, а также как субъекта науки и развитого сообщества. В этой статье трехсторонняя спиральная модель представлена как удобный способ сотрудничества между университетами, промышленностью и правительством с целью продвижения онлайн-образования в высшем образовании. Было обнаружено, что онлайн-образование способствует сотрудничеству с особым способом его организации, который развивает у учащихся базовые навыки, такие как коммуникативные навыки, творческое мышление, критическое и систематическое мышление, аналитические навыки и когнитивные способности. Это исследование способствует развитию теории образования и ряду идей для дополнительных исследований с целью развития людей в сегодняшнем и завтрашнем обществе. В статье даются исследовательские рекомендации. Авторы отмечают, что согласованность взаимоотношений между образованием, наукой и производством является важным условием модернизации жизни человека. Цифровое образование – это не самоцель, а средство достижения гармонии в общественных отношениях, в том числе счастья людей, которые являются частью этого сообщества. Авторы видят поспешное и во многом одностороннее исследование достоинств и недостатков цифрового образования, его видов и методов, но пришло время ученым и учителям начать разработку методов и технологий цифрового образования. По мнению авторов, цифровые технологии изменят систему образования.

Ключевые слова: образование, электронное обучение, модель, промышленность, университет, инновации, цифровой, учитель.

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