The European Proceedings of
Social & Behavioural Sciences
EpSBS

Future Academy ISSN: 2357-1330

https://dx.doi.org/10.15405/epsbs.2019.04.26

CIEDR 2018
The International Scientific and Practical Conference "Contemporary Issues of Economic Development of Russia: Challenges and Opportunities"

TRANSFORMATION OF SCIENCE AND EDUCATION IN THE CONDITIONS OF DIGITALIZATION OF ECONOMY

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Abstract

In recent years, in connection with the processes of digitalization of the economy, based on new technologies in the field of IT, there has been a significant change in the paradigm of managing people and companies. The support of the digital economy program at the state level testifies to the undoubted relevance of this topic for Russia. In the existing realities, there was a question of stimulating the population and companies to the earliest transition to the era of the digital economy. These changes dictate the need for timely public education about the digital economy. The article discusses the promising areas of development of economics in the conditions of digitalization, identified the problems facing the system of economic education at the stage of the formation of a digital society. A significant impact on the transformation in the field of employment speed building educational training networks with the skills of teamwork for the effective resolution of technological, demographic and socio-economic problems is proved. The development of mass open online courses as an innovative project of the digital educational environment are considered. The purpose of the article is to investigate the peculiarities of the transformation of economics and education in the conditions of digitalization of the economy, to identify the main problems of the modern scientific and educational system and to identify the main ways to solve them.

Keywords: Digital economy, digital education, e-learning, mass open online courses, sustainable development.

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1. Introduction

At the present stage of society development and the formation of new social relations, humankind has entered a new phase of its development, which is commonly called the era of digitalization. During this period, human activity is directly related to the creation, processing and use of intangible resources, among which the most important place is occupied by intellectual capital and information presented in digital form. Currently, a significant part of the employed population leaves the sphere of production of traditional types of goods and services and actively begins to participate in the processes of accumulation, storage, search, processing, transmission and redistribution of information, which becomes a full-fledged product of public consumption.

Under current conditions, the digital economy begins to take an active role in all spheres of public life, having a significant impact on the labor market. The digitization of the economic system is the main direction of the state development, the economy and public relations, and the digital economy is becoming a breakthrough technology in the system of sustainable society development. An important condition for the effective development of the main areas of human activity in the digital economy is the formation of an appropriate institutional environment. Personnel, education and science are referred in the Program “Digital Economy of the Russian Federation” to one of the key institutions within which conditions for the digital economy development are created.

2. Problem Statement

In recent years, numerous predictions about a possible decrease in the level of employment due to the Fourth Industrial Revolution, associated with the development of such advanced technologies as robotization, “digitalization”, creation of artificial intelligence, etc. have emerged. Politicians, publicists, sociologists, futurologists, engineers and other researchers are making similar predictions on this subject. Despite the fact that most economists do not share such views, there are still researchers among them who negatively characterize the near future of the labor market. For example, some say that as a result of the introduction of new technologies, a large number of people of working age will not be in demand on the market – machines will finally win the competition between machines and people (Kramer, 2015). Others note that the world community is entering an era of high technological unemployment, to the victims of which the traditional welfare state is unable to help (Frey & Osborne, 2017). Many agree that in the coming decades, about half of all existing professions will go into the past (Heyman, 2016). Researchers predict such a high rate of technological change that workers simply cannot physically retrain for new specialties, as a result of which the number of unemployed will steadily grow (Kim, Kim, & Lee, 2017). Today's schoolchildren and students need to be prepared for the complete disappearance of a multitude of not only little or medium-sized, but also highly skilled workplaces, since new technologies will increasingly take on the fulfillment of intellectual functions that still remain the exclusive possession of man (Sousa, Carmo, Gonçalves, Cruz, & Martins, 2018). The main existential problem that mankind will soon face is how to occupy themselves in conditions of forced inactivity, when the very concept of “work” will become a thing of the past and smart machines will do everything for us (Carnevale, 2016).

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Under current conditions, economics and education cannot develop according to the traditional scenario, their transformation is inevitable, taking into account the existing realities. The late resolution of the questions posed can lead to enormous economic and social costs. All this actualizes the issue of a comprehensive personnel training strategy with new skills, corresponding to modern development strategies and trends of the modern technological revolution.

3. Research Questions

The disclosure of the above stated problems necessitates the search for answers to the following questions:

- What is the concept and what are the key factors of production in the digital economy, what place does the personnel potential take among them?
- What kind of changes are taking place in the labor market in the digital economy?
- What are the problems of the formation of the scientific and educational environment in a digital economy, are there any known ways to overcome them?

4. Purpose of the Study

The purpose of the article is to explore the characteristics of economics transformation in the conditions of digitalization of the economy, to identify the main problems of the modern Russian system of economic education and to identify the main ways to solve them.

5. Research Methods

The study is based on an interdisciplinary approach using logical-structural, situational and comparative analysis methods.

The author's approach is based on the thesis that the development of the digital economy is a certain systemic transformation, in which two interrelated components can be distinguished:

- scientific and educational – responsible for the effectiveness of the methods, forms and mechanisms for the application of economic knowledge in practice;
- technical-technological – determined by a set and combination of material and non-material factors of production, that is, a combination of technologies and equipment.

In this case, in the author's opinion, the first component creates the prerequisites for the formation of the second and underlies it. Hence, it is advisable to consider the emergence of a new type of economy, primarily through the transformation of the scientific and educational component of economic activity. The findings and recommendations can be the basis for the further development of economics and the improvement of the education system in modern conditions of digitization of the economy.

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6. Findings

Modern science and education, like everything else in today's world, is developing with a high degree of uncertainty. The processes of adaptation of scientific and educational systems to the realities of the new economy are complicated by the fact that science and education are traditional, rather slowly developing institutions. However, despite the presence of a certain conservatism, scientific and educational institutions are increasingly using modern technologies to transmit information, provide practice and communicate at a distance. For example, at present, higher education performs not only the basic functions of information transfer and education. Today, universities are institutions where, in addition to the formulation of fundamental thinking, they learn the most important social skills – tolerance, the rules of the game, decision-making and life situations. The formation of curricula and the construction of models of scientific and educational structures is also hampered by the fact that at present it is not possible to clearly understand what knowledge and skills will be in demand even in the near future. Nevertheless, science and education should change, at least while in modern post-industrial society, human potential and social capital play a crucial role.

In the past few years, quite a few public initiatives have been implemented in Russia, they were aimed at the development of education, the revival of social and professional activity, the innovation movement and the raising of science prestige, including economics. The regulatory documents adopted in 2016 and the public discussion of the existing problems ensured the high involvement of various groups of citizens, business, and the pedagogical community in decision-making in the field of education and science. An important event was also the creation in accordance with the Decree of the President of Russia V. V. Putin on December 11, 2015 No. 617 of the All-Russian public organization “Society “Knowledge” of Russia”, the first congress of which was held on June 6-7, 2016.

Since 2015, an independent assessment of the quality of education has become a de facto mandatory procedure for educational institutions. This assessment can make a huge contribution to the development of open education, but its mechanisms are still imperfect. To carry out such an assessment, special criteria and a methodological framework have been developed; in the constituent entities of the Russian Federation, centers for assessing the quality of education are actively functioning and developing, the Federal Institute for Educational Quality Assessment is in operation. At the same time, in normative legal acts there is not even a mention of the mechanisms for the implementation of this assessment, there is no indication of the subjects to whom responsibility should be assigned for ensuring such mechanisms.

The situation at the regional level largely repeats the federal one. For example, on the official websites of regional executive bodies, only 69 regions of the Russian Federation have specialized sections devoted to independent assessment of the quality of education. And we are mainly talking about ratings. They are used in almost 75% of cases. About 39% of the subjects of the Russian Federation publish the results of an independent assessment in the form of generalized analytics (Volosovets, Kirillov, & Buyanov, 2017). Often reports are submitted without specification for individual educational organizations. Meanwhile, the ratings, without explaining what specific assessments the final result was, do not give grounds for making sound management decisions, or for children and their parents to choose a place or a training program. Only in some regions detailed information on educational services in the

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form of rankings (navigators), databases or infographics is available in the public domain. At the beginning of 2016, about a third of all subjects of the Russian Federation began to use such formats.

Secondary schools, high and vocational schools are forced to work in conditions of a growing public distrust of education as a whole. This largely leads to an increase in the control and supervision of educational organizations, increasing the burden on teachers. Surveys show that excessive reporting is the second most important negative factor after low wages, which makes the work of the teacher unattractive. This prevents the attraction of talented teachers to educational institutions and reduces their satisfaction with their work. For the development of education, real autonomy of the educational institution is necessary, it should be provided by legal mechanisms, which is practically not implemented at the moment.

Nevertheless, over the past year, the Russian scientific community has conducted many important studies that yielded concrete results. Among them:

- preparation of a document on the prospects for the development of the country's economy until 2025, which is presented in the form of a panorama of strategic projects and programs, which allows you to clearly define the specialization of large macro-regions of Russia;
- development of methods for the strategic management of the agri-food complex;
- proposal of the development concept of the budgetary structure of the Russian Federation corresponding to the goals of the socio-economic development of the state.

The infrastructure of Russian science, material and technical support of research, and equipment with modern equipment are improving. An increase in the citation of domestic publications is taken place. If in 2000-2004 the citation share was 39.6, then in 2010-2014 it increased to 54.05% (Russia Today, n.d.). Among the BRICS countries, by publication activity, Russia is leading in physics, chemistry, and earth sciences. The number of Russian universities mentioned in world rankings has grown. Thus, 24 Russian universities have already entered the World University Rankings 2016-2017 among the best universities in the world. In addition to the obvious leaders – M.V. Lomonosov Moscow State University, Moscow Institute of Physics and Technology (State University), St. Petersburg National Research University of Information Technologies, Mechanics and Optics (ITMO) – for example, such universities as the Higher School of Economics, Kazan Federal University, Tomsk State University were added.

A large role in the development of research is played by scientific foundations. In 2016, the Russian Foundation for Basic Research was merged with the Russian Humanitarian Scientific Foundation. It is assumed that the merger will allow to optimize the management of funds under their jurisdiction, as well as to organize unified procedures for access to grants, regardless of the scientific profile of the project. At the same time, it is important that within the framework of the RFFR grant policy the necessary attention be paid to supporting projects aimed at the practical implementation of research results.

Despite this, in 2016, the scientific community expressed great concern about the continuing negative phenomena in science. May Decrees of the President of the Russian Federation are not executed. Thus, the share of expenditures on research and development should have amounted to 1.77% of GDP. However, in reality it was 1.1%. This is 2.5 times lower than in the USA, 3.5 times lower than in the

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Republic of Korea, 2-2.5 times lower than in France and Germany (Civic Chamber of Russian Federation, n.d.). A similar share of spending on science is noted in such countries as Brazil, Malaysia and Turkey.

Another cause for concern is a bias in the financing of scientific research, when the budget expenditures on applied scientific research are much higher than the costs of basic research. The existing model of the organization of science does not fully meet the task of transition to the country's innovative development and does not give it a chance to overcome the crisis and take a leading position in the world.

For the further development of economics and education, in the near future it is necessary to implement a series of primary measures, such as:

- development of the National Innovation Development Program, which should provide a full innovation cycle - from basic research to their implementation. This document will contribute to the growth of demand for innovation - the main condition for the intensification of innovation and economic growth;
- legislatively securing for the Russian Academy of Sciences of the right to scientifically and methodically guide all scientific organizations located in Russia, agreeing candidates for the heads of major scientific and educational institutions, expert assessment of the most important state decisions and legislative acts;
- division of the sphere of competence of the Russian Academy of Sciences and the Federal Agency for Scientific Organizations;
- strengthening in higher education institutions training programs in engineering specialties.

The Order of the Ministry of Education and Science of the Russian Federation of August 23, 2017 No. 816 approved the procedure for the use of e-learning and distance learning programs by educational organizations. According to this document, educational organizations have the right to implement educational programs or their parts using e-learning, distance learning technologies, organizing training sessions in the form of online courses, and students who have mastered educational programs in the form of online courses are provided with appropriate document, and gives the right to admit the student to the intermediate certification in another educational organization.

Online education has two main functions. The first is to support traditional learning using a mixed model. The second is to provide those students who do not have access or resources to visit the university with a high-quality and concentrated educational process. And for universities it is important to ensure that the online version of their courses coincides with the experience that full-time students receive.

One of the innovative projects in education is considered mass open online courses (MOOC), which allow to solve a number of problems facing modern education. Open educational resources help in digital pedagogy to provide mass education (the number of those registered in different courses reaches hundreds of thousands of people), accessibility to every student in any territorial point of the world and high quality of education, since these courses are created by the best Russian and foreign teachers. These modern digital technologies allow integrating Russian education into the global educational environment and shaping people of new professions for digital organizations. One of the priorities in the trajectory of digital pedagogy is the formation of a digital educational environment in which massive open online courses will be successfully implemented. This promising form of distance education gives the freedom

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to learn, gives the opportunity to independently choose their future profession, increases the students' motivation to acquire skills that allow them to be competitive in the digital space. MOOC removes space-time restrictions when studying an educational course or its parts, beyond the scope of a single educational organization.

In the period of digital transformation, the role of university teachers changes significantly: they must use all possible techniques, methods, means of electronic and distance learning, as well as participate in innovative transformations of society and business communities, then they will be in demand in the information educational space. Teachers – authors of online courses organize and engage students in online group learning, creating their creative abilities, because the creative class is able to manage the processes of sustainable socio-economic development in the context of digital transformations of social relations.

The systematic training of specialists requires taking into account the most progressive phenomena that are in the forefront of technological development, trends in the development of world scientific and technological progress and the world economy, which "tell" to learn not what is today, but what will be in the near future. The sixth technological cycle, which humanity entered, is associated with NBIC-convergence: integration and synergetic enhancement of the achievements of nano-, bio-, information and cognitive technologies, which will result in the complete merging of these technologies into a single scientific and technological area of knowledge. This feature of this structure must be taken into account in the system of economic education, which should focus on the formation of research competencies and teamwork skills.

The sixth technological cycle will require overcoming the narrow-industry nature of the organization of science and education. In this regard, the issue of interdisciplinary training is of particular relevance. For the first time information technology appeared as technology that has a super-branch nature. Information technology has become a link uniting all science and technology. In this regard, the issue of training of superdisciplinary specialists is being updated, which, however, does not mean the abolition of a highly specialized training system. The creation of nature-like technologies of a new way of life is associated with convergence, the synthesis of humanitarian and natural science knowledge. Thus, economics evolves from narrow specialization to interdisciplinarity, then super-disciplinarity and transdisciplinarity, synergistic effect, interpenetration and interaction with other sciences. It is obvious that, in accordance with this logic, the transformation of the existing educational approaches and methods is inevitable, namely, the creation and development of a methodology related to the fundamental processes of convergence of knowledge that are currently absent in the educational process.

7. Conclusion

In the modern world, radical transformations are taking place, they affect all spheres of life. Digitalization is fundamentally changing the ways of acquiring education, but many problems remain: the inequality of access to digital technologies, the undermining of the quality of education due to various reasons, its mercantilization. The more attention needs to be paid to the fact that modern information and communication technologies can be used to improve the quality and improve the efficiency of education, to promote equality of educational opportunities. Without this, it is impossible to realize the ambitious

goals that Russian society has set itself. In an environment where a person becomes a key element of the digital economy, education acquires not only the value of public goods and fundamental human rights, but the strategic priority for the development of Russian society, which solves the most difficult task – "launching the future" in the context of fundamental civilizational changes.

According to the results of the study, the following conclusions can be made. Firstly, the Russian education system has a high enough potential to train specialists in the digital economy. This is especially important because in a digital economy, people will focus mainly on the realization of new opportunities and the systemic organization of interaction in the ecosystem of people and machines, and routine operations will be performed by machines. Secondly, at present in our country there are original organizational and technological solutions for creating an effective infrastructure of the digital economy. Thirdly, the integration and development of specific cases on the basis of modern principles of the digital economy will create a synergistic effect and lead to a general growth of the Russian economy.

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