Transformation of the Educational Environment and Formation of Human Capital in the Digital Economy

YURI I. SELIVERSTOV and Vladimir V. MOISEEV*

Belgorod State Technological University Named after V.G. Shukhov, Belgorod, ul. Kostyukova 46, Russia

*Corresponding author

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Abstract. The course on the digital economy becomes defining in development of the Russian Federation for the nearest period. There is a demand for human capital of a new quality, focused more not on mastering highly professional skills and competencies, but able to maintain its advantages in conditions of constant changes, striving for constant self-development, having the ability to rapid communications. This requires a significant transformation of the entire educational environment. The article considers and analyzes some aspects of the formation of new approaches to the development of human capital, the analysis of the positions of the participants of this process (the state, universities, business, University faculty), the formulation of problems and opportunities of digital transformation of the educational process. The results of the study confirm the existence of significant positive changes implemented in the sphere of higher professional education in Russia, but also indicate serious problems and challenges in this sphere.

1. Introduction

The digital economy is growing rapidly around the world. It is becoming increasingly clear that the development of end-to-end digital technologies is a key factor in the growth of national economies, allowing companies to ensure global competitiveness. Digital transformation is becoming a major driver of global economic growth. According to estimates of the McKinsey Global Institute, in China, up to 22% of GDP growth by 2025 could be due to Internet technologies. In the United States, the expected increase in value created by digital technologies is no less impressive—here it can reach $1.6–2.2 trillion by 2025. USA. According to the expert group Digital McKinsey, the potential economic effect of the digitalization of the Russian economy will increase the country's GDP by 2025 by 4.1–8.9 trillion rubles (in 2015 prices), which will be from 19 to 34% of the total expected GDP growth (Digital Russia).

Already now we can notice the scale of digitalization of society: Cisco predicts by 2021 the growth of Internet traffic in 127 times compared to 2005, there will be 10 billion new devices (for each inhabitant of the Earth will account for 3.4 devices connected to the network) (Bennett N., Lemoine G.).

At the same time, digitalization is transforming the social paradigm of people's lives. It creates a significant potential for obtaining new knowledge, expanding horizons, mastering new professions and improving skills. As a result, new social elevators are emerging and geographical horizons of opportunities are expanding. First of all, serious social and economic transformations will occur due to the further development and widespread introduction of key digital technologies in all spheres of life. That is, we can talk about the gradual formation of a digital "superstructure" over the usual for us current reality (Competitiveness).
At the same time, there are many new challenges associated with the development of digital culture, changing the role of data in management, the formation of a fundamentally new regulatory framework for the digital economy (Akimov M. A.). The most significant changes, according to many researchers, will occur in the labor market. Experts estimate that 75 million jobs will be cut worldwide in the coming years. However, according to various estimates, 100 million to 125 million new jobs will be created again, but with a completely different content. According to the McKinsey Global Institute, between 2% and 50% of work can be automated by 2036, and by 2066 this share can reach from 46% to 99% (Digital Russia). It is planned to involve personnel in the economy with the help of remote jobs and provide access to quality education. Coordinated actions on training, retraining and employment of the released personnel will be required from the state of business and educational institutions.

A strategically important problem of modern education is the training and education of specialists who are able to constantly improve their professional and intellectual level in the conditions of rapidly developing technologies (Aliyev V.M., Solovykh N.N.).

2. Problem Statement

The task of changing the technological structure and innovative development of the economy is closely related to the training of personnel that meet modern business needs and are competitive in the global market. The economy is in demand for human capital of a completely new quality, in many respects fundamentally different from the existing one. It is estimated that 65% of those currently in primary school will do work that is not yet invented today ("Now You See It). It is not only about new knowledge, but also about the development of project competencies, the formation of readiness for professional activity in conditions of uncertainty, which, in turn, requires a restructuring of approaches to education. It is necessary that universities are not only a ”forge of personnel”, but become the "Alma mater of innovation" in the training system for the innovation sector, and primarily for the digital economy. Consequently, structural, substantive and normative transformations must take place in the educational environment.

Around the world, education faces powerful challenges associated with digital transformation. The structure of demand, geography of students, "carrier" of services, structure of financing changes. These changes have led to a serious change in the supply structure—small, but modern and relevant EdTech companies are becoming more attractive, and classical universities, trying not to concede in competition with them, are actively developing educational technologies and changing educational processes. The key to global educational markets are solutions and platforms that are easily scalable and customized for specific customers, and that can be quickly updated and adapted to the national specifics of educational services consumption.

However, as practice shows, in most Russian universities, informatization of education is understood only as providing the educational process with computer and office equipment, multimedia and Internet access, which in General does not change the nature of training, nor the processes associated with the organization and management of educational and scientific activities.

Is our society, state and universities ready for a significant transformation?

The purpose of this study is to consider certain aspects in the formation of new approaches to the development of human capital, the analysis of the positions of actors in this process, the formulation of problems and opportunities for digital transformation of the educational process.

3. Purpose and Questions of Research

The purpose of this study is to study the problems of increasing human capital in higher education institutions in Russia. The authors tried to find answers to the following key questions.
1. Identify the main aspects of the formation of new approaches to the development of human capital.
2. To study the positions and activities of participants in this process (the state, universities, business, faculty of the University).
3. Clarify the possibilities of digital transformation of the educational process to increase human capital.

State. The digital economy marks the transition to fundamentally new business models. In the modern world, competition in assets and financial resources has been replaced by competition of human capital. At the same time, personnel simultaneously began to turn into the most significant limiting factor. One of the main barriers to digital transformation of an organization can be a shortage of employees with digital skills and the ability to work with advanced technologies (Klimashevskaia O. V.).

In accordance with "The strategy of scientific and technological development of the Russian Federation" approved by the presidential decree of December 1, 2016 No. 642, one of the main challenges is "exhaustion of possibilities of Russia's economic growth based on extensive exploitation of raw materials on the background of the formation of the digital economy and the emergence of a limited group of countries-leaders with new production technologies and focused on the use of renewable resources" (the decree of the President). In this regard, one of the priorities of the National project "Digital economy of the Russian Federation" is the implementation of the Federal project "Personnel for the digital economy "(hereinafter-the Federal project) to provide the economy with a sufficient number of human resources with the competencies necessary for the new age of digital technologies and the economy of knowledge and data.

The Federal project is aimed at providing training of highly qualified personnel for the digital economy. The key areas of the Federal project are:

a) providing the digital economy with competent human resources;
b) support of talented schoolchildren and students in the field of mathematics, computer science and digital economy technologies;
c) assistance to citizens in the development of digital literacy and digital economy competencies.

In particular, the implementation of the direction "Providing the digital economy with competent personnel" includes measures to:

- development of competences for the digital economy, the competence profiles and personal development trajectory;
- improvement of training and retraining programs for the digital economy;
- provision of training and retraining of specialists in digital economy competencies;
- grant support of educational projects.

The first step to the implementation of the direction "Personnel and education" will be the approval of the competence center as a center of expert and methodological support in the implementation of tasks, milestones and activities of this direction. In 2019-2021, the methodological and regulatory framework for the implementation of the roadmap will be prepared, as well as amendments to the relevant state programs and strategic planning documents to synchronize them with the proposals of the program "Digital economy of the Russian Federation". It is envisaged that most of the roadmap initiatives will be meaningfully piloted on individual companies and even regions, for example, in the Central Black Earth economic region. Consistently on a voluntary basis, most innovations will be scaled up at the Federal level.

As a result of the Federal project, by 2024, at least 800 thousand graduates of the vocational education system should have basic competencies of the digital economy, and at least 120 thousand graduates of the higher professional education system will be trained in it specialties. The proportion of the population with digital skills should be at least 40% by 2021. Russia should rise in the ranking of
talent attraction The Global Talent Competitiveness Index from 52 to 30 place. The implementation of the roadmap will create key conditions for the training of digital economy personnel and Russia's transition to a new technological order.

**Universities.** The economic policy of the majority of developed countries since the middle of the XX century focused on the industrial model of the economy, when the main generator of value was mass industrial production, and a person was required to possess specific skills, mainly of a technical nature. The model of "human capital" of the XX century was an engineer in a large factory. For the development of innovation in the world horizon of the third decade of the XXI century requires a fundamentally new human capital. In contrast to the traditional demands of the industrial age, soft skills, over-subject competencies, and the ability to engage in positive social action will be critical to this new reality.

The speed of radical change of technologies in modern conditions is determined by the period of 5-7 years. Therefore, knowledge can become obsolete even before the University graduate will be able to apply them in practice. So first of all it is necessary to teach the skills that will allow you to maintain a competitive advantage in the labor market. The most important thing is that the person himself wanted to learn. If he does not do this, he will be on the periphery of production and social processes.

Many experts argue that today it is more important to teach a person to learn than to give a person specific professional skills.

On the one hand, the number of people receiving education should increase. But on the other hand, is already a significant number of key employers do not consider traditional education as the most important. They believe that the main thing for a potential employee is the presence of skills and abilities. Companies complain that there are huge gaps between what they teach and what they face in practice. Thus, the development of skills should be built into the educational program. Today, most universities do not sharpen the student under the modern employer (especially in the engineering field). Therefore, the concept of professional experience, namely the ability of a person to translate knowledge into activity, becomes the main one.

If the University has a constant interaction with the business community, this gap will be small. Employers make demands for versatile training of the graduate. For this, the elements of digital education plus continuing education work effectively. However, it should be borne in mind that the advantage in entering new markets will be those who have built a reputation in traditional education. It is necessary to build a connection with business and production, from where high-class professionals-practitioners can be attracted for training of students, and where trained specialists should come (Moiseev V.V.).

In the system of professional education, it is necessary to create comfortable conditions for attracting existing employees of the industry to teach educational disciplines in information technology. The number of graduates of higher and secondary vocational education with it skills at the global average level should be 150,000 by 2020, 500,000 by 2025, including among those with higher education—60,000 by 2020 and 100,000 by 2025. (see the program "Digital economy of the Russian Federation»)

In accordance with the program "Digital economy of the Russian Federation", the state pledged to allocate 6 billion rubles annually for retraining. This will allow more than one million people to access online second higher education programs for free (Gretchenko A. I.).

At the same time, there are several problems in the system of professional development. The biggest problem – it is not accepted to invest in it from employers. At the moment, the average cost of employers in Russia for training employees is 10 times less than in Europe. 15% of the working population and 1% of pensioners participate in educational programs in our country. For comparison-in developed countries it is 40% and 5% respectively (P. Luksha, J. Cubista).
Another problem is the lack of culture of self-education and self-development. The average Russian citizen graduates at the age of 25, and the concept of lifelong learning works only in certain narrow market segments, which are served by a number of specialized provider companies that are not focused on mass retraining of personnel. In the context of the transition to a digital economy, such a task arises.

Thus, we can formulate the challenges facing universities that arise in today's situation:

- a) you must install the most trust from the employer and from students (not to replace the employer in determining the areas of training, development of educational programs and teaching should be carried out with the participation of the customer);
- b) it is necessary to awaken in students a serious motivation for continuing education (currently, many people abandon their studies without completing the course completely);
- c) training should be as close as possible to practice (the graduate should know modern technologies and be able to work on modern equipment);
- d) it is desirable to develop entrepreneurial competencies in students (but this can be considered as a separate area of education).

Modern digital technologies provide new tools for the development of universities and other educational institutions around the world. Digitalization provides opportunities to share experiences and knowledge, enabling people to learn more and make better decisions in their daily lives. Thanks to digitalization, today everyone can access information that was previously only available to experts and scientists. The world of education and science has become global, now it is difficult to find a student, teacher or scientist who, if he wishes, has not visited foreign universities in the framework of academic mobility programs.

Digitalization in education can solve several problems:
- ensures financial accessibility (the poor can receive the same education as the rich);
- expansion of choice-the ability to find and choose a teacher not only in your University and in your country, but also to use foreign practice;
- access to skills that are not available in traditional education (for example, medical practice on digital models, species games, stimulators, modeling of cabins of cars, airplanes and other equipment);
- adaptation of human interests under his abilities and Vice versa (universal adaptation through short modules).

It should be agreed that education is in a state of turbulence, as the demands of society, business, and the state are constantly changing. What it will be in 15-20 years today is not taken by anyone. To continuously improve the training system, it is very important to be able to predict which professions will be in demand in the future. Modern practice shows that it is very difficult to predict which professions will dominate the labor market in 15-20 years. Often, when teaching specific skills, their uselessness quickly comes. Therefore, it is not these specific skills that need to be taught, but the skills to adapt to change. That is, first of all it is necessary to develop cognitive skills in students, since they are the most adapted to change. People should come to the market ready for rapidly changing conditions, capable of reflection and development. It is also necessary to acquire new social skills (ability to communicate, work in groups).

Thus, from our point of view, it is necessary to develop the following competencies:
- to form and develop opportunities to create values (to create);
- be able to work in a conflict environment;
- to be able to take responsibility.
- learn to see the systemic picture and critically comprehend it.

L. V. Shmelkova, Vice-President of the Institute of mobile educational systems, for her part, proposes to conditionally group these competencies into 3 blocks.

1. Digital competence—confident and effective use of information and communication technologies for work, leisure and communication.
2. Initiative and entrepreneurial competencies—the ability to turn ideas into action through creativity, innovation and risk assessment, as well as the ability to plan and manage projects.

3. Soft skills—the ability to build intercultural network communications (social and professional), learn and improve (Shmelkova L. V.). According to I. M. Yagafarov and E. V. Tereletskova, modern training of a specialist in our country should form a certain system of knowledge, including basic theoretical training, based on the development of values and analytical abilities, as well as a practice-oriented component associated with the development of professional competencies, i.e., a set of professional knowledge, skills, methods of performing professional activities. At the same time, the emphasis is transferred to the acquisition of such skills that determine the readiness of the individual to perform certain actions, both universal and special professional, practical, including entrepreneurial. (Yagofarova I. M.).

Teachers. Speaking about who to teach and how to teach, it would be wrong to ignore the question of who will teach. In the current development of the educational market there is an interaction of numerous "players" of various sizes—from small startup enthusiasts to government agencies. The development of cooperation between them is not an easy task, since traditionally formal education is quite closed, while the creators of grassroots innovative projects do not always understand how to integrate organically into the existing system. The goal of stakeholders of the educational process is not just the establishment of cooperation between different structures and objects, but the creation of holistic ecosystems, versatile development of all involved in it.

In the perimeter of formal education systems there are "new people"—innovators in education. Their projects often offer training in areas that are not covered by national programs, the approaches and methods used do not fall into the usual pedagogical theories, and the ways of interaction with customers are fundamentally different from traditional ones. Most innovators have to overcome the resistance of formal education systems, customer distrust and critical perception on the part of investors, which significantly slows down the use of these "agents of change" in the transformation of education.

Today, about 1.5 million people work in the sphere of Russian higher professional education. This is a huge creative potential and ignoring this potential in favor of adherents of new approaches to education is simply unacceptable. Digital transformation of the educational process cannot be realized without a teacher. In this case the actual participation of the teacher can fit into two main schemes:

a) traditional—working with finished material on order (using interactive learning tools, 3D printers, etc.);

b) innovative—the teacher invents and implements his own teaching techniques and techniques.

At the same time, the tension between traditional approaches and innovative approaches is growing. Traditionalists see online education as another tool of the ordinary educational process. Conversely, developers of new educational products consider online courses as a basic type of educational process.

The success of the transformation of the educational process largely depends on the desire and capabilities of the teaching staff. We assume that the education system is conservative. Therefore, the changes must be gradual. Otherwise, they are likely to face strong opposition from the teaching community.

As practice shows, the leadership of universities, attending various seminars, exhibitions, meetings imbued with reformist sentiments and many of them would like to see something new in their universities.

Students in the bulk do not mind either. They also want to be aware of everything new, rightly believing that it will help them in future positioning in the labor market. Digitalization in universities is necessary not only for the transformation of the educational process, but also for the analysis of the student environment. Students demonstrate a much greater propensity to apply new technologies in their daily lives. This is especially true of it and Internet technologies, as well as their application not
only for socialization and communication, but also in the professional sphere. Thus, the digitalization of the University will make it more adapted to the target audience.

The main resistance in this situation arises in the environment of the faculty (hereinafter-PPP). Very often, PPP does not see the point in the proposed changes, but only additional work for themselves. It is very important that the meaning of the ongoing transformations should be brought to every teacher. Of course, all the unknown scares, so there must be someone who will dispel fears and point to the benefits. And of course the motivation factor should not be left out.

New educational technologies are certainly very important, but they will never replace the teacher. But also the teacher should correspond to the level of knowledge and interests of students. Therefore, it is necessary to teach first of all teachers. The solution is seen in the activation of the system of training. Training courses for teachers should become a mandatory part of the working process of teachers, but not on a formal basis, but as close to reality as possible. The form of such courses can be both traditional and online courses.

No one will deny the fact that we need "fresh blood" among teachers. But this is hampered by regulatory barriers and, as before, the low level of remuneration of the teaching staff.

4. Research Methods

In this study, the following methods are used.
1. The analytical method will be used to analyze published works on the topic of this article.
2. Systemic and structural-functional approaches allow us to form a holistic view of the formation and development of human capital in higher educational institutions of Russia.
3. The institutional approach used in the study allows the authors to identify the role of the government, the ministry of higher education and science, university leadership in the implementation of state policy in the field of human capital.

5. Conclusion

1. The digital economy challenges both workers and employers to adapt to new conditions.
2. Every University, regardless of the chosen strategy, must undergo a digital transformation. This transformation is not only and so much in the implementation of it solutions, but in General is a significant cultural and organizational change in the University.
3. You can try to catch up with foreign universities, but this is almost hopeless. The way out is to "overtake the curve", that is, to offer and implement something fundamentally new (for example, the projects "Digital University", "University 20.35").
4. In the long term the Russian education system at all levels needs a large scale transformation based on the following principles:
   a) lifelong education;
   b) flexibility of educational trajectory;
   c) modularity of educational courses;
   d) application of modern teaching methods, formats and tools, including digital educational tools and remote education formats;
   e) interaction of educational and research organizations among themselves, with the business community and government agencies to ensure the relevance and importance of educational programs and reduce the time of adaptation of educational systems to market requirements;
   e) development of the trainees' professional, personal, social skills and skills of solving interdisciplinary tasks focused on practice.
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References

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