Transformation of the education system in a digital economics

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Abstract — **The article considers the features of the development of the education system in the digital economics. The main purposes and priorities of modern national projects and programs in the field of economics, education and digitalization are presented. A theme of organization and work of the educational technology fund is touched on, the main directions in the implementation of the digital educational environment of the Russian Federation are highlighted. The problem of organizing network educational platforms in the framework of e-learning and distance learning technologies is considered. The basic information and communication technologies and e-learning trends are listed: learning management system (LMS), massive open online course (MOCC), social media, knowledge management, adaptive learning.**

Keywords — *digital economics, informatization, human resources, education, national project, e-learning, learning management system, massive open online course.*

I. INTRODUCTION: DIGITAL ECONOMICS, SOCIETY INFORMATIZATION AND EDUCATION

In modern society, the issues of modernizing education for the new tasks of the world economy, and in particular for each country individually, are relevant [1-2].

Currently, a number of national and federal projects and initiatives are being implemented in the Russian Federation aimed at creating the conditions for the innovative development of the digital economy. First of all, this is the Strategy for the Development of the Information Society in the Russian Federation for 2017–2030 and the Digital Economy of the Russian Federation Program.

The National Program "Digital Economy of the Russian Federation", approved by Decree of the Government of the Russian Federation No.1632-p dated July 28, 2017, defines the main purposes and priorities, in particular, the creation of an ecosystem of the digital economy, in which digital data are a key factor of production in all areas of social and economic activity; elimination of restrictions for the development of high-tech industries; increasing the competitiveness of industries of the Russian Federation economy.

A focus of the domestic economy on the innovative way of development is designed for the interrelated formation of the scientific, technical, industrial, financial, social and institutional spheres [3]. Obviously, at the same time, a socially-oriented technological breakthrough is impossible without developing an effective innovation strategy that defines the main areas of priority financing, creating an intellectual and information structure, updating the legislative base of the innovation sphere as well as informatization of society and restructuring the scientific and educational sphere [4-5].

Presidential Decree of May 9, 2017 No.203 "On the Strategy for the Development of the Information Society in the Russian Federation for 2017-2030" defines the main purposes, objectives and principles for the development of the information society in the Russian Federation. The main tasks that need to be solved to achieve the purposes include, in particular, improving the quality of education based on the development and use of information and telecommunication technologies, "developing economy of the Russian Federation through using information and telecommunication technologies" and "developing science, technology and engineering, training qualified staff in the field of information and telecommunication technologies".

The implementation of national projects in the Russian education system, the introduction of innovative technologies, the solution of the problem of staffing are among the main points of the implementation of this strategy. It is necessary to make long-term forecasts of technological development; to focus on the priorities of the research sector of higher education, to create conditions for the implementation of research results and experimental developments.

On May 7, 2018, the Decree of the President of Russia Vladimir Vladimirovich Putin "On the national purposes and strategic objectives of the development of the Russian Federation for the period up to 2024" was published. The decree was signed "in order to implement breakthrough scientific, technological and socio-economic development of the Russian Federation, increase the population of the country, increase the living standards of citizens, create comfortable conditions for their living, as well as conditions and

opportunities for self-realization and unlocking the talent of each person".

The Government of the Russian Federation, together with public authorities of the constituent entities of the Russian Federation, is entrusted with developing national projects (programs) in 12 areas, including the "education" area. In particular, by 2024 it is necessary to achieve a number of targets: the global competitiveness of Russian education, the Russian Federation is among the 10 leading countries of the world for the quality of general education; the introduction of new educational technologies, the formation of an effective system for identifying, supporting and developing abilities and talents in children and young people, the creation of a modern and safe digital educational environment, the modernization of vocational education.

The emergence of fundamentally new corporate strategies has a significant impact on the global educational environment, so in the context of the basic directions of development of the digital economy it is necessary to focus on training, education, information infrastructure [6-10]. In the context of the ongoing changes in the economy and society, the tasks, quality criteria of the Russian system of higher and secondary vocational education in the context of the unlimited possibilities of the digital economy are changing dramatically over time [11-14].

II. Foundation for the Development of Educational Technologies

One of the main conditions for the modernization of the Russian education system is the integration of information and communication technologies (ICT) into everyday educational practice [15]. Today, ICT is the driving force and coordinator of the growing globalization of the educational environment [16].

On February 9, 2019, the 4th annual convention of the industry union "Neuronet" took place in Moscow. At the opening of the convention, Dmitry Peskov, a special presidential representative for digital and technological development, announced the formation of a foundation to support the creation and implementation of new educational technologies [http://neorusedu.ru/]. It is also assumed that this foundation will support the introduction of the best domestic developments to international markets. The amount of financing of domestic projects should be about 7 billion rubles. This is the largest investment in Russian history. This amount is allocated only for educational technologies, not counting several tens of billions intended for the national project "Education" and the federal project "Personnel for the digital economy".

The foundation will support the replication of the best technological solutions and the introduction of the best domestic developments to international markets. The period of the Foundation activity is about 10 years with the possibility of extension after a joint assessment of the results. Investment Director of the Russian Venture Company Alexey Basov said that the Foundation is being created as part of the "Personnel and Education" action plan of the Digital Economy of the Russian Federation program of the Government of the Russian Federation. The mandate of the Foundation involves investing in projects in 8 key areas: "Content Creation", "Management", "Search", "Joining", "Experience", "Training", "Confirmation

of Knowledge" and "From Training to Work". Acceleration project support is also planned.

"The task of the foundation is not to replace the participants who concentrate on the creation and implementation of progressive educational technologies, but to provide them with a tool for sharing risks and attracting investment expertise. The foundation's strategy involves close integration into the educational ecosystem, an active partnership with accelerators, universities, development institutions and private investors. And we expect that the Foundation will become an investment platform consolidating the common efforts to transform the education system and develop human capital in the country", said Alexey Basov.

III. Digital Educational System in Russia

A new educational paradigm enhances the role of e-learning, including distance learning [17-19]. The regulatory framework governing online learning is improving in the Russian Federation. These educational technologies obtain additional funding, including through the project "Modern Digital Educational Environment".

"Modern digital educational environment in the Russian Federation" is a priority project in the field of education which was approved by the Government of the Russian Federation on October 25, 2016 as part of the state program "Development of Education" for 2013-2020. The purpose of the project is to provide conditions for the continuous education of all categories of citizens by creating a Russian digital educational space.

There is a widespread introduction of online training courses with interactive participation and open access via the Internet. Modern technologies and best e-education practices, the scientific potential of the leading universities of the country [20-21] should be used to implement this project.

The project includes a number of key areas, including:

- adoption of legal and regulatory acts aimed at the development of online learning;
- creation of information resources and online learning platforms;
- creation of 3,500 online courses on secondary, higher, and supplementary education programs with the involvement of leading developers from both government structures and the business community by 2025;
- formation of a system of expert and user assessment of the quality of the content of online courses;
- creation of ten regional competency centers in the field of online learning;
- training and education of at least 10,000 teachers and experts in the field of online education;

By the end of 2025, it is estimated that more than 11 million citizens will be online-trained. Until 2020, it is planned to allocate the amount of about 1 billion rubles on grants related to online training. Funding provides support for integration solutions for the development of e-education: creation of software, technological infrastructure, services, etc.

The system of higher education is one of the effective levers of technological, economic and social progress, an effective factor in the implementation of national policy and one of the key basis of the formation of a democratic society.

Comprehensive state support and stimulation of various educational strategies for the creation of innovative programs and knowledge-intensive industries are a strategic objective which is indicated in the concept of long-term socio-economic development of the Russian Federation.

Successful implementation of the project "Modern Digital Educational Environment in the Russian Federation" will fundamentally change the approach to education of the country citizens, successfully implement the main provisions of the concept of long-term socio-economic development until 2020, according to which the Russian economy should be transitioned to an innovative type of development.

On February 14, 2019, the Russian Investment Forum took place in Sochi - RIF-2019 [https://rusinvestforum.org/about/o-forume/ Issues of the socio-economic development of Russia as well as interim results of the implementation of the priority project "Modern Digital Educational Environment in the Russian Federation" were discussed in the course of this large event. "The national project "Education" as a resource for socio-economic development and the formation of the human resources potential of the constituent entities of the Russian Federation" was the title of one of the business platforms of the forum. It was noted that "the development of human capital is the basis of the country's systemic and long-term success in the context of globalization and introduction of the digital economy, and investment in human resources is the main driver of strategically profitable and subsequently convertible into particular indicators of the socio-economic development of regions investment" [http://www.sbras.ru/files/news/docs/program_sochi_2019.pdf].

IV. eLEARNING: E-LEARNING TECHNOLOGIES AND TRENDS

The "eLearning elements" conference will be held for the seventh time in Moscow on May 29-30, 2019 during which it is planned to discuss key issues of e-learning in Russia: tools for creating effective advanced training and additional training programs, information on all modern trends and tools of eLearning-industry [http://conf.elearningpro.ru/]. This is one of the most exciting and large events on corporate training technologies for eLearning specialists. Here the emphasis is placed on "eLearning", since simple "Learning"is formally included in this concept and cannot exist separately in the modern world.

Currently, due to the eLearning format, the topic of blended learning is quite popular. "eLearning" includes courses, tests, video and audio content, infographics, charts, various visualizations, simulators, interactive and gamified courses, micro courses, webinars, forums, blogs, etc. All of these tools have their own purpose and can be part of a blended training program consisting of full-time and distance formats. The main "eLearning" trends include the Learning management system (LMS), MOOC - massive open online course, adaptive learning, mobile learning, gamification, social learning, knowledge management, etc**.**

A. *Learning management system (LMS)*

LMS is a kind of open online university, an e-learning platform, the key principles of which are defined in the abbreviation itself. Learning: with the help of LMS, it is possible to create a unified database of e-courses and study materials. Management: courses and students management System: an electronic system that makes it possible to implement training in different cities and, moreover, automate the work of checking tests, collecting statistics and preparing reports.

It should be noted that in the territory of Russia and the CIS countries the abbreviation DES is more common - the distance education system. The difference between these educational approaches is that training with the help of LMS can take place, but not necessarily remotely, i.e. distantly. This means that it is possible to assign e-courses and to plan offline in-class training with the same success. We are talking about the so-called "blended learning" - full-time with the use of distance educational technologies (DET).

Currently, the LMS-system as a mechanism to improve the quality of teaching full-time students: symbiosis of competitive approach and social network technologies based on free software [22].

There are several varieties of modern knowledge management systems:
- cloud platforms that don't need to be installed on an organization's server (iSpring online, TeachBase, Loop, Learn Amp, Matrix, ets.). Similar LMSs work like a web service;
- server LMS (Moodle, RedClass, etc.). In this case, the DES must be installed on the server. All data is stored within the organization;
- LMS with integration with CMS (Content Management System). In this case, the services are conveniently embedded in the CMS which allows to make the maximum profit from the use. Examples of integrating LMS with content management systems: wordpress, joomla, drupal, wix.

B. *Massive open online course (MOCC)*

One of the latest innovations in education is the possibility of distance learning through online e-courses. The transition to online education began in the 2000s due to the emergence of open online courses, when well-known world universities began to publish recorded lectures in free access. The demand for such educational services turned out to be extremely high, and already in 2008 a fundamentally new method of education under the MOOC (Massive Open Online Course) was formed [23-24]. There are two types of MOOC.

Firstly, these are courses that can be studied independently - an analogue of electronic interactive courses. In courses of this type, the emphasis is on an understandable course structure, high-quality video content, interactive subtitles of all video lectures and their main content.

Secondly, these are courses with a schedule and mandatory support. They are an analogue of full-time study, but with distance communication of participants. These courses focus on the organization of interaction and the creation of a community with the support of questions and tasks in the forum, a social block for meeting the participants, group tasks, etc. It is possible to discuss and solve creative problems, perform virtual labs and create virtual collections and resources.

In general, MOOC is a full-fledged distance learning course that allows to realize a wide range of corporate training opportunities [25]. It should be emphasized that potentially developing courses in the MOOC format is much faster than

developing standard interactive courses. In addition, there are ready-made high-quality MOOC on the market for eLearning-technologies for the required topics that can be immediately used in training [26]. Today, along with the quantitative growth of the MOOC, there are also radical qualitative changes in the form of active use of modern multimedia technologies (HD video, 3D world, augmented and virtual reality, cave technologies, gamification elements), as well as the enhancement of interactive and communicative components of education.

C. Social learning, knowledge management and adaptive approach. Web 2.0

Social learning provides the opportunity to communicate and educate people through ICTs and social interaction means [27]. Currently, there is a clear trend of using social media in the educational sector. Social networks make it possible to maintain multiple contacts based on common interests, including learning activity and knowledge sharing. In relation to the emergence of online systems, enabling virtual presence, social media began to spread rapidly. In this context, the term "Virtual Presence" means the indirect interaction of people through media communication channels which become an alternative to face-to-face communication. New platforms are emerging for such new social phenomena as the network community, which, in turn, enhances the social interaction effect of remote users. Formal classical education is complemented by new educational technologies of social media. There is a new term "media education" which provides students with the formation of social communication skills.

Currently, there is a tendency of transition from DES to knowledge management systems. More and more specialists in training are influenced by the terms "social learning" and "knowledge management." Creating a knowledge base for a technical support service is one of the knowledge management tools, but not a "Knowledge Management System".

The transition from distance learning systems to a knowledge management system not only increases the efficiency of using DES, but is also being introduced with the aim of achieving a second thing - creating a knowledge management phenomenon and a learning culture in a company or at work. The trend of transition to knowledge management systems can be viewed as a natural professional growth of DES which had formed a fairly large knowledge base in order to make the training portal full-fledged and move away from the usual strategy of "learning the course - final certification". If the educational portal is considered as a knowledge management system, it is necessary to apply a fundamentally different approach to the development of educational content and the construction of learning paths. Each new training course should be perceived as another intersubject element that can be used in other educational programs. The more efficient and mobile the controllability of these elements, the easier it will be to use and customize the educational programs themselves and the LMS as a whole.

In 2005, Tim O'Reilly described the concept of an "evolved world wide web" which he termed Web 2.0, noting its importance as the next generation of Internet systems [https://www.oreilly.com/pub/a/web2/archive/what-is-web-20.html]. Web 2.0 is a conceptually new perception of the Internet, this is a new Internet era, when the world wide web is based not on sites, but on people, their knowledge, their interaction. In fact, these are the websites of a new generation, the main difference of which is the possibility of using the "collective mind" and "collective activity". Web 2.0 users become creators of information themselves, they independently develop content. The interactivity of the web pages and the simplicity of the interfaces technologically ensure user involvement, since no special knowledge is required to post information on the Internet.

Web 2.0 technologies will provide an adaptive individual learning path via the Internet. Specially equipped calendars integrated into Web 2.0-based platforms independently carry out class planning, all necessary information is stored on the so-called encyclopedic sites or presented in the form of photo, audio or video lessons, and these services do not require synchronization in their work.

Knowledge management will enable the implementation of personalization learning technologies, connected to an adaptive approach [28-31]. There is no need to develop a single course or a single educational program. It is enough to register a learning scenario in the LMS that adapts to each individual student, adapts to his level of knowledge and pace of learning. It is necessary to effectively manage the electronic content in the LMS, to be able to create "puzzles" from which an adaptive program is assembled to do it. In the context of learning personalization, it is assumed that the student is managed by the educational content based on the teacher's recommendations. Thus, there is a formation of an individual learning path, taking into account an adaptive approach. It is important to keep track of the relevance of the learning scenario and its constituent elements, to remember that there are other systems and information resources beyond the LMS which can additionally be prescribed in the learning paths.

V. CONCLUSION

One of the most important tasks on the way to achieving the international competitiveness of the Russian economy and the development of regional subjects of the Russian Federation is the training of highly qualified specialists [32-33]. The system of higher education is an effective lever of technological, economic and social progress, an effective factor in the implementation of national policy.

In the context of the set strategic objectives, the most important direction of technological modernization of Russia is the improvement of the education system, the development of human resources capable of responding to the innovative challenges of the global economy which have professional competencies to implement various large-scale projects in high-tech and knowledge-intensive industries. This is a strategic task of national significance on which the competitiveness and security of the state directly depend.

Projects of national and federal significance are designed to ensure the creation of new and development of current opportunities at all stages of the educational strategy, including the integration of the best international and domestic practices, taking into account the individual needs and characteristics of each region of the Russian Federation. The organization of effective science-integrated educational clusters and digital platforms is designed to guarantee the necessary human resources for the development of innovative

sectors of the economy, to provide a point of growth of the investment climate in Russia.

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