New Industrialization of Russia: Challenges to the Higher Education System

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***Abstract*—The importance, opportunities, and problems of the higher education system in the process of training personnel for the digital economy in the context of new industrialization have been considered. The analysis and synthesis of studies have been presented by leading organizations of Russia to understand the readiness of Russian higher education for online learning, openness and the willingness of lecturers to introduce modern educational technologies in their activities. Research devoted to the study of the online education perceiving by Russian consumers and their desire to use its capabilities, as well as business attitudes towards the training of online specialists, has been analyzed.**

Keywords – new industrialization, digital economy, opportunities and challenges of higher education, personnel for the digital economy, digitization of education, e-learning, online education, online learning, educational technologies, MOOC.

I. INTRODUCTION

The current stage of development of the Russian economy is new industrialization, which involves the development of new, highly efficient technologies that significantly increase the technical equipment of labor and its productivity. Production at the stage of new industrialization is not only industrial production itself—Industry-1, but also the production of life support works and services—Industry-2, which includes upbringing, training, and education [1].

The Digital Economy of the Russian Federation Program, adopted by the Government of the Russian Federation, provides an impetus not just for the restoration of domestic industry, but for the creation of modern commercial industrial production based on digital technologies of domestic developments and the development of the digital economy. Today, new-generation cadres with creative and innovative orientation are also needed for the construction and development of the domestic digital economy. This requires a cardinal review of the entire education system and wage policy [2].

Thus, within the priority project "Modern Digital Educational Environment in Russia", the quality and expansion of continuing education opportunities for all categories of citizens is expected to increase due to the development of the Russian digital educational space. The main goal of the project is high-quality and affordable online learning of the country's citizens using digital technologies [4]. Obviously, such a transformation of the educational environment will allow employees to form the competencies necessary for future enterprises. The preparation and development of young talented researchers who are able to consolidate and strengthen the leadership of Russian science in the world is a key factor in the scientific and technological development of the whole country [5].

II. LITERATURE REVIEW

The significant reality of this time is the demand for advanced training, which faces a new goal—the turn-out of a new type of managers who are ready to solve problems on their own under remote access. The peculiarities of such training are: new principles of organization of the educational process, a high intellectual level of education, saturation of educational material with scientific information, emphasis on studying the mechanisms of scientific and technical interaction in the context of business globalization [7]. According to G.A. Reznik and M.A. Kurdova, the transition to the sixth technological order has expanded the basic functions of universities: the educational function has been transformed into a function of continuing education, the research function involves the development of new and rethinking existing knowledge, the educational function has been transformed into a function of forming general cultural competencies, and the social one implies the obligatory consideration of the interests of various groups of society [8].

The active introduction of e-learning has contributed to the growth in the number of studies devoted to the investigation of the lecturer's openness and readiness to introduce modern educational technologies in their activities. David McConnell found that lecturers give lectures a central place in the formation of theoretical knowledge. They see collaborative online learning as the best option: combining traditional lectures with electronic resources that students find freely available on the Internet and study on their own, as well as performing online tasks on various platforms [11]. The emergence of innovations in the educational environment is a reaction to the establishment of a new digital generation.

Students of this generation are fully prepared to use all available academic sources, open to a wider use of electronic resources, and can perform more complex tasks that require constant and immediate feedback [13]. With the digitization of the younger generation, Alona Forkosh Baruch and Ola Erstad reveal four problems in the field of education: environmental one—awareness of the risks and opportunities of educating the younger generation in the digital world; the dynamics of intergenerational and intercultural relations using digital technologies; the formation of norms and values in the technological world as a continuous process, similar to the LLL process; bringing up representatives of a new type of citizenship—a digital one[10].

Undoubtedly, the effectiveness of introducing innovations in the educational process largely depends on the personality of the lecturer. Investigating the activity of lecturers in the application of digital technologies, Camilleri and Camilleri emphasize the influence of socio-demographic characteristics of the teaching staff on their level of technological innovation, perception of ease of use and utility of technologies, the level of technological anxiety [15]. Francisco D. Guillén-Gámez and José Mayorga-Fernández and Francisco J. Álvarez-García, on the contrary, did not reveal the influence of the age of lecturers on their activity in the application of information and communication technologies. They see two components that determine the use of modern educational technologies by lecturers—digital competence and motivation. Therefore, they call the promotion policy to be an important factor in introducing innovations in the educational process, which should be carried out by the leadership of educational organizations [12].

The introduction of innovative educational technologies allows solving an important problem for the economy of the region—reducing unemployment. Massive open online courses are more in demand among the unemployed, as well as employees of those organizations that do not have the conditions for training and advanced training [14].

At the same time, the introduction of online education implies both great opportunities and problems that allow us to conduct a discourse on the development of a distance learning system [6].

III. METHODOLOGY

The most significant development under the digitization of education and meeting the needs of the new economy, in our opinion, was the introduction by universities of mass open online courses on various educational platforms. In order to understand the readiness of Russian higher education for online learning, the Russian consumer for online education, as well as the attitude of business to online training, an analysis of research submitted by leading Russian organizations has been conducted: the Ministry of Education and Science of the Russian Federation (end of 2017) [3], the National Research University Higher School of Economics, together with the Analytical Center of Yuri Levada as part of the Monitoring of the Economics of Education (MEI) in 2016 [9]. This study is based on desk methods for analyzing, comparing, and summarizing primary data.

According to the Ministry of Education and Science of Russia, if the majority of students and lecturers were reluctant to online learning (the answer is “somewhat positive, something negative” was chosen by 56% of lecturers and 57% of students), then the business reacted to this idea positive—45.6% of top managers and 50% of HR directors chose this answer. But the rectors and vice-rectors chose a “golden mean”—about 41% of heads of educational institutions particularly positive attitude to online education and as many more—with reservations. In order to understand the difference in opinions, it is necessary to recall the data of Rosstat: almost 60% of Russians do not work in their specialty, that is, there is a gap between market needs and offers from educational institutions. Accordingly, the “social order” of the professions market can be satisfied owing to the retraining system and raising the competence of personnel.

The question of supporting the implementation of online education projects revealed an interesting fact: online education has received the most approval from HR directors of commercial organizations (68.4%) and university students (55.7%), that is, the heads of HR departments are more interested in flexible, convenient, and continuous improvement of the level of staff training without discontinuing the main activity, often based on the needs of their organization. Accordingly, students are ready to form their own individual educational trajectory, which means willingness to take responsibility for their education, gaining knowledge, and the formation of specific skills that will be useful to them in the future.

Leaders of commercial organizations (42.1%) and leaders of universities, vice-rectors, and heads of online education (40.9%) support the project to a lesser extent. It is believed that education received in the audience through direct contact with the lecturer and the group develops communication skills, forms the necessary humanitarian competences: the ability to think logically, analyze, work in a team, and skills of self-presentation. But this is not formed during the online training.

The respondents called the possibility of continuing education and lifelong education throughout the country/world at any convenient time (55.3%) as one of the important factors supporting the online education project. This is followed by the possibility of obtaining additional professional or second higher education (43.8%), satisfaction of interest, cognitive leisure (38.4%), obtaining prestigious and well-paid work, career advancement (26.6%), substantial savings on training (25.5%), obtaining basic higher education (11.8%), personal reputation of “the modern digital person”, the respect of colleagues (8.4%). Thus, the desire to learn throughout life is a fundamental factor for the modern person, as it gives the opportunity to build his/her professional career.

NRU Higher School of Economics investigated the relevance of the MOOC from the point of view of lecturers and students of Russian universities.

We reviewed the monitoring data from the perspective of three criteria characterizing each group of respondents:

- awareness;
- an attitude;
- interest and willingness to use.

The level of awareness of lecturers and students of Russian universities about the possibilities of using mass open online courses is shown in Table 1.

TABLE I. THE LEVEL OF AWARENESS OF LECTURERS AND STUDENTS ABOUT THE POSSIBILITIES OF USING MASS OPEN ONLINE COURSES, % OF THE TOTAL NUMBER OF RESPONDENTS [COMPILED FROM 11]

Respondents	***Know and use***	***Know, but do not use***	***Don't know***
Lecturers	11.2	48	40.8
Students	3.8	23.2	73

As can be seen from the Table, only a quarter of the students surveyed are aware of the existence and the opportunities offered by the massive open online courses. Among lecturers, the proportion informed about MOOC is much higher, but only a tenth of them use these resources for self-education.

Low degree of involvement of students and lecturers in online learning can be determined by a negative attitude (Table 2).

TABLE II. THE PROPORTION OF STUDENTS AND LECTURERS VIEWED NEGATIVELY TO THE REPLACEMENT OF PART OF THE COURSES IN THEIR UNIVERSITY BY MOOC, % OF THE NUMBER OF THOSE WHO KNOW ABOUT THEM [COMPILED FROM 11]

Respondents	***Replacing a general course***	***Replacing a special course***
Lecturers	39.3	61
Students	24.2	36.3

The data presented confirm two aspects:

- lecturers are more negatively inclined to replace courses for MOOC disciplines;
- both students and lecturers are more negative about the replacement of special courses than general subjects.

The current more loyal attitude of both groups of respondents to traditional forms of education is explained by the low degree of awareness of innovative technologies in education. In addition, a negative attitude can be explained by the deficiencies that students and lecturers distinguish for themselves in MOOC (Table 3).

TABLE III. DEFICIENCIES THAT STUDENTS AND LECTURERS SEE IN USING THE MOOC, % OF THE NUMBER OF RESPONDENTS [COMPILED FROM 11]

Deficiencies	***Lecturers***	***Students***
No individual communication with the lecturer	44.6	42.6
High probability to quit training	36.8	48.4
Inability to control the identity of the performer	35	30.2
Reduced learning quality	26.8	19.0
The need to pay for certificates	20.1	23.8
Lack of tight intermediate and final control	16.9	21.6
Many courses in a foreign language	14.8	15.4

As can be seen from the Table, the opinions of students and lecturers about the main deficiencies are quite similar. Almost half of the respondents in both groups are not satisfied that online learning does not involve personal contact between the lecturer and the student. At the same time, lecturers are worried about organizational issues—the inability to control the identity of the performer, as well as the decline in the quality of training. Students are not satisfied with the lack of clear control, as well as self-control—a high probability of dropping out.

Given the level of awareness and prevailing attitudes toward mass open online courses, the willingness of students and lecturers to study using these resources is of particular interest (Table 4).

TABLE IV. PERCENTAGE OF STUDENTS AND LECTURERS WILLING TO STUDY USING MOOC, % OF THE NUMBER OF RESPONDENTS [COMPILED FROM 11]

Respondents	***Definitely going***	***Maybe yes, maybe no***
Lecturers	25.9	60.3
Students	18.0	70.2

As can be seen from the data, more than half of the respondents (both students and lecturers) are not sure that they will use mass open online courses for training. In our opinion, it is interesting that lecturers are more willing to use online resources for self-education. This somewhat contradicts the fact that students—representatives of the digital generation—are considered a priori as the most promising audience of MOOC.

We would like to emphasize that the development of innovations in education should be accompanied not only by their active discussion in the circle of the narrow community—state structures, management of educational organizations, and lecturers. It is necessary to purposefully inform the general public about the opportunities offered by innovative educational technologies, using clear and accessible means of communication for various audiences. Undoubtedly, a large role in the development and popularization of online learning is assigned to the State.

IV. PRACTICAL RELEVANCE

Higher education in the digital economy is designed to form a new middle class. All this leads to a fundamental change in the labor market, the emergence of new competencies, improved cooperation, increased the responsibility of citizens, their ability to make independent decisions. The basis of the educational process is innovativeness and education of a new generation, ready to learn all their life and generate innovations. The main function of learning, education is to "teach to learn", to be ready for changes, to work with more complex projects, to borrow advanced, including foreign practices, to expand the horizons, tracking trends in other industries and professions. Moreover, the digital competence of universities' graduates must exceed the existing range of competencies in order to work ahead of the situation.

Digital technologies radically change not only the content of the taught subjects, but also the form of their presentation. There is a transformation of the learning process. The need for a lecturer as a knowledge repeater ceases to exist. Consumers have a need to develop motivation to learn, transfer skills and coach as a mentor. Education goes beyond classrooms, laboratories, libraries.

The advantages of digitization of education for a student are as follows:

– the ability to independently decide when, where, and how much he/she will be able to study the material, how much time to devote to studying the material, since he/she himself/herself is an individual training schedule. It develops self-reliance and motivation of the student;

– the opportunity to study at several educational institutions at once and to build an individual educational trajectory, moreover, on a part-time basis;

– the opportunity to learn both Russian and foreign advanced experience;

– opportunity to form individual curriculums;

– the opportunity to learn, take the current and intermediate control in a relaxed atmosphere, thereby reducing the level of stress load;

– the opportunity to ask for help from the teacher-consultant at any time by e-mail without taking into account the time of consultations in full-time education;

– lower cost of distance learning compared with full-time education gives access to education to people with lower incomes;

– the opportunity to start their working career in high school, communicating with practitioners and specialists, completing assignments for a particular organization.

Lecturers have opportunities to:

– build an educational material in the form of electronic resources using the software of the university and lecturer's competencies;

– shape additional knowledge from leading Russian and foreign practitioners and specialists in a particular field;

– build educational material in accordance with current trends in the industry;

– unify the learning process, provide all students with equal access to electronic databases and resources without taking into account the individual characteristics and personal traits of the student and teacher;

– document the learning process through e-mails with students;

– provide individual counseling by electronic correspondence with the student;

– have an evidence base in case of controversial issues.

The task of the lecturer is to help students navigate the vast amounts of information.

The advantages for the university are as follows:

– an increase in the number of students who study remotely, which allows universities to increase incomes and develop online learning;

– promotion of educational services and the university brand;

– development of motivation, independence, organization, and responsibility of students. This leads to an increase in the level and quality of students' knowledge, because, as is well known, the information that a person finds and studies independently is better fixed in memory;

– the need to build effective interaction with employers to identify promising professions and competencies of graduates, since a significant role is assigned to real practical projects in real organizations;

– the ability to attract leading Russian and foreign experts, as well as research institutes for a deeper study of issues in a particular field;

– the possibility of solving the problem of unsuccessful people, which is already causing serious concern;

– creation of conditions for training persons with disabilities and handicapped persons.

However, there are problems associated with the development of the innovation process of education under the digitization:

1. The digitization reform of education assumes that educational institutions are equipped with modern technology, namely: computers with the ability to connect to the Internet, information systems that allow access to educational resources, the results of modern research and development, electronic scientific libraries in various languages of the world. This makes the educational process dependent on information technology, since the educational institution's electronic database may be vulnerable to hackers and lose all or part of its documentation, including the history of control and courseworks, educational materials, etc.

2. Insufficient level of technical equipment of universities and potential recipients of educational services; lack of modern technical means for effective two-way communication, as well as appropriate software for viewing presentations, video films and performing tasks.

3. Poor use of standards in distance education. The variety and quality of distance learning technologies are largely determined by the policy of each specific educational institution and its financial and technical capabilities. A narrow range of electronic materials offered by the university for students due to the lack of the possibility of creating training videos, broadcasting video lectures, organizing video surveillance of the final and intermediate certification of students.

4. The use of expensive educational technologies will inevitably affect the cost of education in universities. This causes a significant variation in the price and quality of distance learning in various higher educational institutions.

5. The lack of a strong student motivation and such qualities as willpower, a sense of responsibility, ability to effectively control oneself. Not everyone is able to maintain the necessary training rhythm, maintain performance capability, and perceive a large amount of new information without external control.

6. Insufficient or low computer literacy of the lecturer and the student.

7. The lack of confidence in the lecturer that the student independently performed the work sent.

8. More theoretical, not practical training.

V. FINDINGS AND CONCLUSION

Overall, it can be noted that online education does not undermine the traditional system and does not pose a threat to modern universities, but, on the contrary, creates an opportunity for cooperation, and not competition among leading universities. Online education increases university fame and the availability of its programs, while not claiming to completely replace the traditional system, since it does not represent a full-fledged program in the specialty and does not issue a diploma of higher education. At the same time, students have the opportunity to build their educational strategy and develop in addition to basic education without taking into account the level of basic education, remotely, at any time, convenient for them, using progressive forms of education.

Meanwhile, limitations and shortcomings that exist are the basis for cooperation and dialogue in the educational environment: the ability to count online courses when certifying students, the lack of quality assurance for training, obtaining a certificate from the platform and not from the university that developed the course, the inability to evaluate all the knowledge using the tests, limited opportunities in solving and testing practical tasks. All these issues are now on the agenda of the global educational community. Leading Russian universities are actively working on the development of digitization and this has given important rise to discussion.

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