DIGITALIZATION OF THE RUSSIAN EDUCATION SYSTEM: OPPORTUNITIES AND PERSPECTIVES

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ABSTRACT
The aim of the paper is to define the current state, possibilities, and prospects of digitalization of the Russian system of (higher) education while maintaining the current approach to state regulation of this process and developing a new (improved) approach for its acceleration. For this purpose, a method for estimating the degree of digitization of the (higher) education system has been developed and applied. As a result, it is found that at the present time (2018), the greatest degree of digitalization is characteristic for additional indicators of the functioning of the system of (higher) education in contemporary Russia, such as the work of library resources and state and public monitoring. At the same time, the degree of digitalization of key indicators (educational and research activities of universities) is low. At the same time, the infrastructure for digitalization of the Russian system of (higher) education is sufficiently developed, which determines significant opportunities for the further development of this process. The final degree of digitalization of the Russian system of (higher) education is estimated at 25.8% and is very low. The reason for this problem lies in the inadequate state regulation of the process of digitalization of the Russian system of (higher) education. To solve the problem, the authors developed and presented a new (improved) approach to state regulation of the digitalization of the Russian system of (higher) education. This approach implies full-scale financing of relevant activities, priority promotion of digitalizing the main activities of the (higher) education system, as well as orientation to the proposed model for the functioning and development of a (higher) education system based on digital technologies. Its practical implementation will increase the efficiency and competitiveness of the Russian system of (higher) education.

KEYWORDS
Digitalization, Digital Economy, Digital Modernization, Russian Higher Education System.

1. INTRODUCTION
In today's global economy, global competition is underway in the development and dissemination of digital technologies. To maintain the competitiveness of the domestic economic system in the conditions prevailing in the external environment and to improve its efficiency, the Government of the Russian Federation approved the Program on Digital Economy of the Russian Federation (Order No. 1632-r. Dated July 28, 2017) (Government of the Russian Federation, 2018b), which proclaimed the course for digital modernization. One of the key directions of the practical implementation of this program was “Cadres and Education”. However, in this direction, emphasis is placed on the training of personnel in the field of digital technologies and is not expected to digitize the education system itself (Digital Economics of Russia 2024, 2018). Digital modernization of the education system is declared as one of the most important tasks of the State Program of the Russian Federation "Development of Education" for 2013-2020 (Order No. 792-r of May 15, 2013) (Government of the Russian Federation, 2018a). At the same time, neither practical measures for digitalization of the education system nor indicators for monitoring their implementation in this program are envisaged. According to the latest information (February 2018), presented at the Russian investment forum and devoted to the discussion of the prospects for the development of digital education, a serious obstacle on the way to implementing this process is the concern about the unpreparedness of society, especially at the lower levels of the education system (Ministry of Education and Science of the Russian Federation Federation, 2018).

In this regard, the system of higher education has the highest potential in the field of digitalization in contemporary Russia. In the context of the general course for the digital modernization of the Russian economy, preserving the traditional (pre-digital) technological order of the (higher) education system, which plays an infrastructural role in the economy, is inappropriate because it would hinder the entire process of this modernization.

In this regard, the problem of digitalization of the Russian system of (higher) education becomes highly relevant. The working hypothesis of this research is related to the fact that at present, due to insufficient regulation, the degree of digitalization of the Russian system of (higher) education is low. The aim of the work is to define the current state, possibilities, and prospects of digitalization of the Russian system of (higher) education, while maintaining the current approach to state regulation of this process and developing a new (improved) approach for its acceleration.
2. MATERIALS AND METHOD

Despite the multiplicity of existing studies and publications on this topic, the methodological support for assessing the degree of digitalization of a (higher) education system is weak and relies primarily on statistical indicators that are not taken into account in contemporary Russia. Therefore, in this article, the authors develop a method for estimating the degree of digitalization of a (higher) education system, assuming the use of the following calculation formula:

\[
C_{DES} = \sum (I_{DES} \times \text{Mass})
\]

where \( C_{DES} \) is a coefficient reflecting the degree of digitalization of a system of (higher) education (being measured in % from 1 to 100, where 1% is the minimum degree, 100% is the maximum degree);

\( I_{DES} \) represent the values of the degree of digitalization of a system of (higher) education (being measured in % from 1 to 100, where 1% is the minimum degree, 100% is the maximum degree);

\( \text{Mass} \) stands for the weight of these indicators (measured in fractions of 1, comprising 1 in the total amount);

The proposed composition of indicators and their weights (determined by the degree of importance in the education system) are given in Table. 1.

<table>
<thead>
<tr>
<th>Types of activities</th>
<th>Indicators ((C_{DES}))</th>
<th>Weight (the sum of 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key</td>
<td>Educational process</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>Research activity of universities</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Interaction of universities with enterprises (linkage of education and labor market)</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>Selection of applicants for admission to universities</td>
<td>0.02</td>
</tr>
<tr>
<td>Additional</td>
<td>Infrastructure support</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Library resources work</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>International cooperation</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>State and public monitoring</td>
<td>0.05</td>
</tr>
</tbody>
</table>

(Source: Authors)

Table 1. Indicators of the degree of digitization of the system (higher education) and their weight.

The indicators in Table 1 are qualitative, and values are assigned to them on the basis of expert estimates, which makes it possible to apply the developed method in the conditions of a deficit of statistical data.

3. DISCUSSION

The conceptual and applied issues of digitalization of the system of (higher) education in the context of building a digital economy are discussed in numerous studies and publications by such scientists as (Baumol and Bockshecker, 2017), (Bogoviz et al., 2018a), (Bogoviz et al., 2018b), (Bogoviz et al., 2018c), (Chashchin et al., 2013), (Cheng et al., 2018), (Fleacă, 2017), (Ghemawat, 2017), (Munro, 2018), (Murphy and Costa, 2018), (Pacheco et al., 2018), (Popkova et al., 2015), (Ratzinger et al., 2018), and (Sukhodolov et al., 2018), which served as the theoretical platform for this work.

4. RESULTS

Based on the results of the evaluation of the digitization degree of the Russian system of (higher) education in 2018 with the use of the method developed by authors, we obtained the following results (Figure 1, Table 2).
Figure 1. Graphical interpretation of the degree of digitalization of the Russian system of (higher) education in 2018.

As can be seen from Figure 1, the greatest degree of digitalization is characteristic for additional indicators of the functioning of the system of (higher) education in contemporary Russia, such as the work of library resources (90%), state and public monitoring (80%), and international cooperation (40%). At the same time, the degree of digitization of the main indicators is low. For example, the degree of digitalization of the educational process is 15%, the research activities of universities is 20%, the interaction of universities and enterprises is just 5%. At the same time, the infrastructure for digitalization of the Russian system of (higher) education is quite developed (70%), which determines significant opportunities for the further development of this process.

<table>
<thead>
<tr>
<th>Types of activities</th>
<th>Indicators</th>
<th>Weights</th>
<th>Values, % (1-100)</th>
<th>Values*weights, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key</td>
<td>Educational process</td>
<td>0.35</td>
<td>15</td>
<td>5.25</td>
</tr>
<tr>
<td></td>
<td>Research activity of universities</td>
<td>0.25</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Interaction of universities with enterprises (linkage of education and labor market)</td>
<td>0.15</td>
<td>5</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>Selection of applicants for admission to universities</td>
<td>0.02</td>
<td>30</td>
<td>0.6</td>
</tr>
<tr>
<td>Additional</td>
<td>Infrastructure support</td>
<td>0.05</td>
<td>70</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>Library resources work</td>
<td>0.03</td>
<td>90</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>International cooperation</td>
<td>0.1</td>
<td>40</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>State and public monitoring</td>
<td>0.05</td>
<td>80</td>
<td>4</td>
</tr>
<tr>
<td>IN TOTAL:</td>
<td>the degree of digitalization of the Russian system of (higher) education (CLDES)</td>
<td></td>
<td></td>
<td>25.8</td>
</tr>
</tbody>
</table>

Table 2. Results of the evaluation of the degree of digitization of the Russian system of (higher) education in 2018.
As can be seen from Table 2, the final degree of digitization of the Russian system of (higher) education (the value of $C_LDES$) was estimated by us at 25.8%, which is very low. The following shortcomings of the current approach to government regulation of this process are the key reasons for this problem, creating barriers to realizing the available opportunities in the field of digitalization of the Russian system of (higher) education:

- Absence of a model for the functioning and development of a (higher) education system based on digital technologies, which should be guided by program activities in the field of digitalization of this system;
- Deficiency of financing activities in the field of digital modernization of the Russian system of (higher) education. Thus, the aggregate amount of financing of the State Program of the Russian Federation "Development of Education" for 2013-2020 is only 0.85% of GDP for these years (3992.3 billion), while the share of financing activities in the field of digital modernization of the education system is 0.049 % of this volume (i.e. 3992.3 * 0.049 = 195.62 billion for 8 years or 24.45 billion per year) (Government of the Russian Federation, 2018a);
- The emphasis is on the digitalization of additional elements of the Russian system of (higher) education with insufficient attention (and slow pace) to the issues of digitalization of the basic elements of this system.

If the current approach is maintained, most likely, by 2020, or in the next few years, significant progress will not be made in the digitization of the Russian system of (higher) education. To solve this problem and increase the degree and speed of digitalization of the Russian system of (higher) education, we developed a new (improved) approach to government regulation of this process, which is shown in Figure 2.

Model of functioning and development of the system (higher) education on the basis of digital technologies

State regulation of the digitalization process of the Russian system of (higher) education:

- Full-scale funding of relevant activities in the amount of at least 0.2% of GDP per year;
- Priority stimulation of digitalization of the (higher) education system main activities;
- Focusing on the model of functioning and development of the system (higher) education on the basis of digital technologies.

<table>
<thead>
<tr>
<th>1 Digital educational process</th>
<th>2 Research activity of universities with the use of digital technologies</th>
<th>8 Digital library resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Digital selection of applicants for further admission</td>
<td>Russian system of (higher) education</td>
<td>5 Digital infrastructure support</td>
</tr>
<tr>
<td>7 State and public monitoring</td>
<td>3 Digital interaction with enterprises</td>
<td>6 Digital international cooperate</td>
</tr>
</tbody>
</table>

Key results:

- Increasing the efficiency of primary and secondary activities of universities by reducing costs while simplifying and accelerating operational processes, as well as improving their effectiveness;
- Increasing the competitiveness of the Russian system of (higher) education due to the growth of the quality of educational services, including the qualifications of graduates, services (convenience), and other characteristics;
- The growth of research activity of universities and its effectiveness through automation.

(Source: Authors)

As can be seen from Figure 2, in accordance with the new (improved) approach to government regulation of the digitalization process of the Russian system of (higher) education, this regulation presupposes:

- Full-scale funding of relevant activities in the amount of at least 0.2% of GDP per year;
- Priority stimulation of digitalization of the (higher) education system’s main activities;
- Focusing on the model of functioning and development of the system (higher) of education on the basis of digital technologies.

The order of financing and stimulation of digitalization of various elements of the Russian system of (higher) education is shown in Figure 2 by digits from 1 to 7, where 1 is the highest priority, and 7 is the lowest priority. The model of functioning and
development of the (higher) education system on the basis of digital technologies is also presented in Figure 2. It shows there are opportunities, perspectives, and the need for full digitalization of the Russian system of (higher) education. The key results of the proposed approach are to increase the efficiency of primary and secondary activities of universities by reducing costs while simplifying and accelerating operational processes, as well as to increase their effectiveness and, therefore, competitiveness of the Russian system of (higher) education due to the growth of the quality of educational services, including the qualifications of graduates, services (convenience), and other characteristics, to expand international scientific and educational cooperation of Russian universities, and to increase research activities of universities and its effectiveness through automation.

5. CONCLUSION

So, the results of the research confirm the working hypothesis and show that the digitalization of the system of (higher) education in Russia is at the initial level (25.8%) and covers only some elements of this system while maintaining the traditional (pre-digital) technological way of educational and research activities of universities. The failure to use the capabilities of digital technologies hinders the development of this system both in terms of increasing its effectiveness and in terms of increasing its global competitiveness.

The reason for this problem lies in the inadequate state regulation of the process of digitalization of the Russian system of (higher) education, which is associated with financing under the residual principle (in turn, leading to underfinancing), the lack of a model for the functioning and development of a (higher) education system on the basis of digital technologies, on which certain program activities in the field digitalization of this system can focus (unclear regulatory objectives), as well as the incorrect arrangement of funding priorities and the stimulation of this system’s elements (emphasis on digitalization of additional elements while paying insufficient attention to the basic elements of the system).

To solve the problem, the authors developed and presented a new (improved) approach to state regulation of the digitalization of the Russian system of (higher) education. This approach implies full-scale financing of relevant activities, priority promotion of digitalization of the main activity of the (higher) education system, as well as orientation to the proposed model for the functioning and development of a (higher) education system based on digital technologies. Its practical implementation will increase the efficiency and competitiveness of the Russian system of (higher) education.

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