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# THE ASSESSMENT OF THE UNIVERSITY PREPAREDNESS FOR DIGITAL TECHNOLOGIES IMPLEMENTATION

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### *Abstract*

The effectiveness of professional education substantially depends on the wide use of digital technologies and products in the educational process. However, the effectiveness of the implementation of these technologies largely depends, on the one hand, on the readiness of the digital educational environment, and on the other hand, on the level of digital literacy and the competence of the teachers. So, it is necessary to develop a methodology for assessing the level of preparation of the university for digitalization, the purpose of which is to provide a unified approach to the assessment of the educational information environment and the factors providing it in the educational process, as well as to remove obstacles to the effective implementation of educational programmes and services using digital technologies and products. The analysis of the existing methods has shown that they assess the level of the digital development of various sectors of the economy and society in general, but do not affect the educational system or evaluate the digitalization of the educational process only from the technical point of view. Taking into account all the above-mentioned circumstances, the authors propose to evaluate the readiness of universities for digitalization of the educational process on the basis of the analysis of the factors directly affecting the digitalization of the educational process, such as: digital transformation of the educational environment of the university and the level of preparation of the teachers for the work in the digital environment.

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**Keywords:** Digitalization, digital technologies and products, educational environment, digital literacy, digital competence.



## 1. Introduction

The Russian educational system as an agent of global digitalization of the society should provide the economy of the country with a confident transition to the digital age. The Decree of the President of the Russian Federation No. 204 “On the National Goals and Strategic Tasks of the Development of the Russian Federation for the Period until 2024” from May 7, 2018 sets the task of creating a modern and safe digital educational environment ensuring high quality and accessibility of education of all kinds and levels by 2024 (“Decree of the President of the Russian Federation of May 7, 2018 No. 204”, 2018). This will be possible due to the introduction of digital educational technologies and products in the process of professional education (Amhag, Hellström, & Stigmar, 2019).

Taking into account the basic documents regulating the construction of the digital economy and digital education in terms of goals, objectives, planned results, technologies, forms of organization of the educational process, the interaction of teachers and students, quality parameters of professional education and tools for its assessment, the ideas concerning the role of professional education in the implementation of social and economic reforms, the solution of the tasks of a steady increase in the quality of life and the further consolidation of Russia as a strong and developed state are significantly changing.

In order to develop the system of professional education intensively, its further improvement on the basis of the introduction of digital educational technologies and products is proposed, aimed at achieving the goals meeting the requirements of the digital economy and the digital society and taking into account the significant features of the digital generation of students (Lakkala & Ilomäki, 2015).

## 2. Problem Statement

When implementing these goals, it should be taken into consideration that the process of digitalization of education, on the one hand, requires the formation of a digital educational environment - a combination of digital teaching aids and electronic educational resources, and, on the other hand, the modernization of the educational process providing training for students in the digital society and professional activities in the digital economy. Besides, the most important condition for the digitalization of the educational process are digital skills and competence of the teachers and their willingness to digitalize education (Spante, Sofkova, Lundin, & Algers, 2018). Thus, the assessment of the level of preparation of the university to the educational process digitalization should take into account all the factors determining the effectiveness of the digital transformation of universities and the educational system in general (Lacka & Wong, 2019).

## 3. Research Questions

However, at present, only some approaches have been developed for the assessment of the level of the economy and society digitalization, the most common among which at the world and domestic levels are the indices of the development of information and communication technologies, of the digital economy and society, of the global digital competitiveness, of the digital evolution, of the digitalization of the economy, of network preparation, of electronic participation, of global connection, of innovations, of cybersecurity, of the development of e-government, the “Digital Russia” Index, etc.

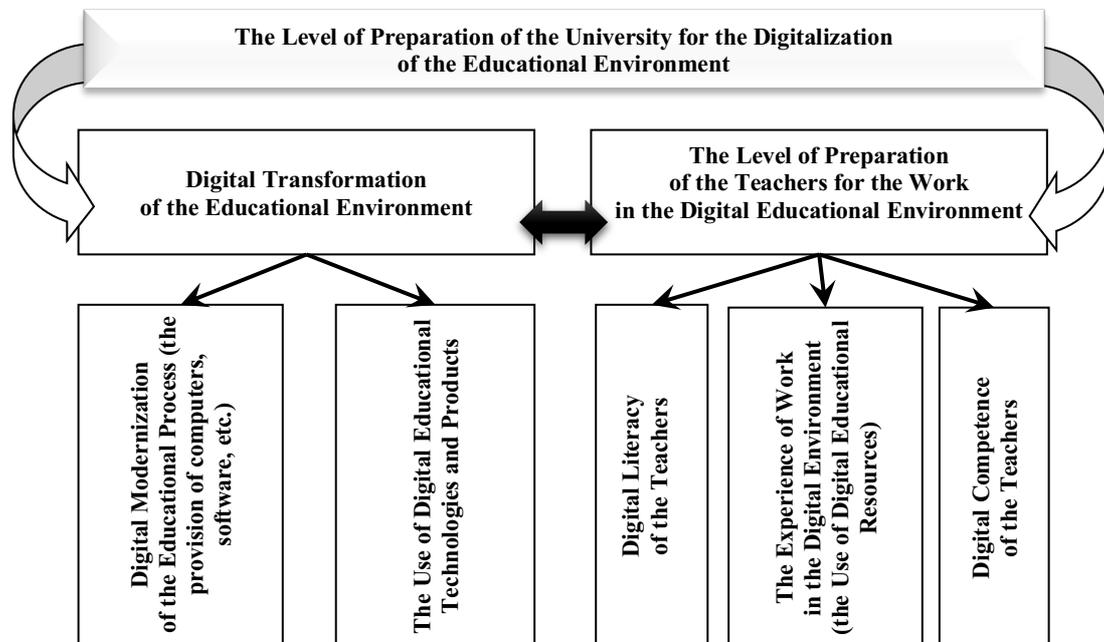
These assessment methods determine the level of the digital development of various sectors of the economy and society in general, but do not affect the educational system or evaluate the digitalization of the educational process only from the technical point of view (Bridgstock, 2016).

Among the methodologies of the assessment of the level of educational digitalization there should be highlighted the methodology of the assessment of a unified index of the digital university based on the assessment of the complex of factors reflecting five main directions of development of digital competencies of universities: production process, information infrastructure, information security, human capital and R&D (Plotnikova, Efremova, & Zaborovskaya, 2019).

However, this methodology does not include factors connected with the digitalization of the educational process and its main elements and, therefore, does not make it possible for us to assess the level of preparation of the university for the educational process digitalization (Mertala, 2019).

#### 4. Purpose of the Study

Taking into account all the above-mentioned circumstances, it is proposed to assess the level of preparation of universities for the digitalization of the educational process on the basis of the analysis of the factors directly affecting the digitalization of the educational process (Ilomäki, Paavola, Lakkala, & Kantosalo, 2016). The proposed integrated methodology will make it possible to assess the level of preparation of the university for the digitalization of the educational process on the basis of the integral indicator that includes 2 blocks of indicators: digital transformation of the educational environment of the university and the level of preparation of the teachers for the work in the digital environment (Figure 01).



Source: authors.

**Figure 01.** Indicators of the level of preparation of the university for the digitalization of the educational environment

The system of indicators of the level of preparation of the university for the digitalization of the educational process should:

- Be viewed as the source of information for specific performers and reflect their goals, reasons and interests in the digitalization of the educational process;
- Be presented in the form of commensurable values;
- Reflect the goals of the university digitalization;
- Take into account the time horizon and be presented in perspective;
- Be viewed as an information basis for the improving of the educational process;
- Be comparable with the indicators of international assessment systems.

## 5. Research Methods

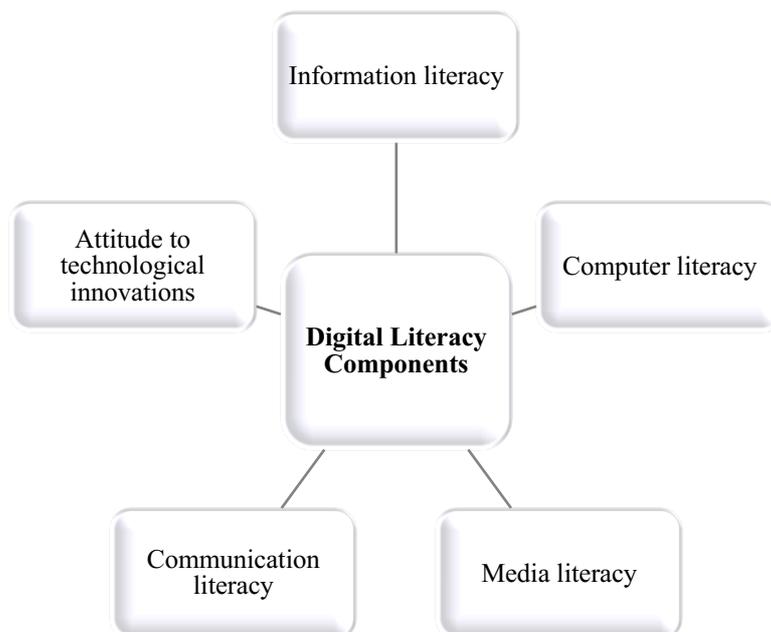
The following composition and contents of indicators for the assessment of the level of preparation of the university for the educational process digitalization in the context of the above blocks is proposed. The indicators of the first block are the indicators of the level of preparation of the university for the digitalization of the educational environment. They can be divided into two groups.

The first group of the indicators reflects the digital modernization of the educational process. They are aimed, first of all, at the assessment of the level of provision of the educational process with personal computers, laptops, tablet computers, smartphones, interactive boards and other technical devices, safe and fast Internet connection at the university, access to Internet-connected digital devices, etc.

The second group consists of the indicators of the use of digital educational technologies and products. They are oriented towards the assessment of the use of electronic library systems, electronic versions of textbooks on specific subjects or topics, electronic legal reference systems, electronic versions of reference books, encyclopedias, dictionaries, etc., educational computer programmes on specific subjects or topics, software packages for different specialties, computer testing programmes, virtual simulators, massive open online courses, online programmes, etc. at the university (Baran, 2014).

The formation of the second block of indicators - the level of preparation of the university teachers to work in digitalized educational environment - was also carried out on the basis of three groups highlighted in the Figure 01.

The first group – the indicators of the digital literacy of the teachers– is based on the approach announced within the frame of the Summit G20 (Berlin, April, 2017) (Chetty, Wenwei, Josie, & Shenglin, 2017) and implemented in the research of the Analytical Centre of the National Agency of Financial Research (Aimaletdinov, Baimuratova, Zaitseva, Imaeva, & Spiridonova, 2019). Within the framework of this approach, the digital literacy of teachers is viewed as “the ability to manage information safely and properly, understand and integrate it, share it, evaluate and create information and access it using digital devices and network technologies in order to participate in economic and social life” (UNESCO, 2018, p. 87). The assessment of digital literacy includes the assessment of 5 groups of indicators, each of them being evaluated in three aspects: knowledge, skills and abilities (Figure 02) (Chetty, Wenwei, Josie, & Shenglin, 2017).



Source: authors.

**Figure 02.** Indicators of the digital literacy of the teachers

The development of the second group - indicators of work experience in the digital environment - is based on the approach formed in the project "Education Efficiency Improvement Programme" (PEESA) as part of the EU Higher Education Cooperation Programme (EDULINK II) (Grünwald, Pfaffenberger, Melnikova, Zaščerinska, & Ahrens, 2016). Within the framework of this approach the teacher should have the following skills in the digital environment.

- Skills of using the Internet in the educational process;
- Skills of using digital technologies for didactic purposes and in educational design;
- Skills of digital technologies use in the systems of education management;
- Skills of video conferencing use in the educational process;
- Skills of network interaction (social networks) use in the educational process;
- Skills of electronic moderation in the educational process.

Development of the third group - indicators of digital competence of the teachers – is determined by the European Digital Competence Framework 2.0 for teachers (DigCompEdu Framework) (European Commission, 2018), which was adapted by the Analytical Center of the National Agency of Financial Research for the Russian System of Education (Aimaletdinov et al., 2019). In DigCompEdu Framework 22 digital competencies of teachers are allocated and grouped in six blocks.

Systematization, generalization and adaptation of all groups of indicators made it possible to form a system of indicators of the level of preparation of the university for the digitalization of the educational process (Table 01).

**Table 01.** The system of indicators of the level of preparation of the university for the digitalization of the educational process

Column Heading	Column Heading
<b>The Indicators of the Digital Transformation of the University Educational Environment (I<sub>1</sub>)</b>	
The indicators of the digital modernization of the educational process (I <sub>1</sub> <sup>1</sup> )	Interactive boards in each classroom
	Access to digital devices (PC, laptops, tablet computers, smartphones) at the lesson
	Safe and fast Internet connection at the university
	Access to digital devices connected to the Internet
The indicators of digital educational technologies and products use (I <sub>1</sub> <sup>2</sup> )	Availability and use of: <ul style="list-style-type: none"> <li>▪ Electronic library systems;</li> <li>▪ Electronic versions of text-books on specific subjects or topics;                             <ul style="list-style-type: none"> <li>▪ Electronic legal reference systems;</li> </ul> </li> <li>▪ Electronic versions of reference books, encyclopaedias, dictionaries;</li> <li>▪ Educational computer programmes on specific subjects or topics;                             <ul style="list-style-type: none"> <li>▪ Computer testing programmes;                                     <ul style="list-style-type: none"> <li>▪ Virtual simulators;</li> </ul> </li> <li>▪ Massive open online courses;</li> <li>▪ Online programmes.</li> </ul> </li> </ul>
<b>The Indicators of the Level of Preparation of the University Teachers for the Work in the Digital Educational Environment (I<sub>2</sub>)</b>	
The indicators of digital literacy of the teachers (I <sub>2</sub> <sup>1</sup> )	Information literacy
	Computer literacy
	Media literacy
	Communication literacy
	Attitude to technological innovations
The indicators of the experience of work in the digital environment (I <sub>2</sub> <sup>2</sup> )	Skills of using the Internet in the educational process
	Skills of using digital technologies for didactic purposes and in educational design
	Skills of digital technologies use in the systems of education management
	Skills of video conferencing use in the educational process
	Skills of network interaction (social networks) use in the educational process
	Skills of electronic moderation in the educational process
The indicators of digital competence of the teachers (I <sub>2</sub> <sup>3</sup> )	The use of digital technologies in professional interactions with colleagues, students and other interested parties
	The use, creation and exchange of digital resources in the educational process
	The use of digital resources in teaching and learning
	The use of digital technologies for the evaluation of the students' progress
	The use of digital technologies to expand the rights, responsibility and self-dependence of the students
	The use of digital technologies to develop digital competences of the students

Source: authors.

To assess the indicators of the level of preparation of the universities for digitalization of the educational process, the developed online questionnaire is used; the assessment is carried out according to

a 5-point system. An assessment scale has been developed for each group of indicators, which is converted into a system of levels, with the optimal and low levels.

The integrated assessment of the level of preparation of the university for digitalization of the educational process is determined as the average of the standardized values of the components characterizing the digital transformation of the university educational environment ( $I_1$ ) and the level of preparation of the university teachers to work in the digitalized educational environment ( $I_2$ ).

$$I_j = (I'_1 + I'_2) / 2$$

where  $I_j$ - the value of the indicator of the level of preparation for the digitalization of the educational process for the  $j$ -university;  $I'_1$  – the standardized value of the component characterizing the digital transformation of the educational environment of the  $j$ -university;  $I'_2$  – the standardized value of the component characterizing the level of preparation of the teachers of the  $j$ -university for the work in the digitalized educational environment.

The standardized values of each component are determined in the following way:

$$I''_{ij} = I_{ij} / I_{\max}$$

where  $I_{ij}$  – the value of the  $i$ -component for the  $j$ -university;  $I_{\max}$  – the maximum value of the  $i$ -component.

## 6. Findings

The processes of informatization, virtualization and the use of multimedia as successful trends in the development of education have substantially changed the characteristics of both the educational process itself and the educational space. Therefore, there are practically no ways to update educational processes without taking into account the features and innovations stipulated by the above-mentioned processes; and the effectiveness of professional education substantially depends on the wide use of digital technologies and products in the educational process. Taking into account all the above-mentioned circumstances, the authors propose to evaluate the readiness of universities for digitalization of the educational process on the basis of the analysis of the factors directly affecting the digitalization of the educational process, such as: digital transformation of the educational environment of the university and the level of preparation of the teachers for the work in the digital environment. On the basis of the systematization, generalization and adaptation of the digitalization indicators of the university, proposed in the study of the National Agency of Financial Research, in the EDULINK II projects, as well as in the European Framework of Technological Competencies for Teachers, the system of the indicators of the level of preparation of the university for digitalization of the educational process is formed.

## 7. Conclusion

The development of the digital educational environment of professional education is a transformation of the educational process and its elements, on the one hand, and digital technologies and tools used in the educational process, on the other. The purpose of the educational process transformation is to maximize the use of digital technologies and products capacities aimed at improving the quality of professional education that meets government priorities in this area and is already enshrined in regulatory

documents at all stages of solving the tasks. Realization of this goal requires the development of a unified methodological approach to the functioning, creation and development of information educational environments and systems that provide them in the educational process, as well as the removal of obstacles to the effective implementation of educational programs and services using digital technologies and products. The use of the proposed methodology will serve as the basis for a deeper analysis, identification of problem areas, determination of the university teachers training needs based on the digital competence of teachers, subsequent generalization, structuring and prioritization of the digitalization of the educational process at universities.

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