Digitalization of economy: discourse analysis perspective

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Abstract. Digital economy represents a system of economic relations mediated by technological achievements. In the near future, according to the opinion of some analysts, companies with a high level of digitalization will take the leading positions in the global and national markets. Today, a number of progressive companies are widely introducing digital tools in various sectors of the economy, investing money in the construction of data processing centers and the introduction of storage systems for business operations and customers. It is understood that digital tools may allow combining production with individuality, shortening the period from the development of an innovative idea to the sale of finished products, and providing an opportunity to achieve effective customization to meet consumer requirements. This is exactly what we are witnessing today in the activity of higher education institutions which have demonstrated flexibility and predictive capability in fitting in with modern economic processes.

1 Introduction

Nowadays, the areas of communications and the spread of information are undergoing serious changes. It has become a common practice that all spheres of life are in some way connected with digital technologies and operate with their help. Most countries have come to understanding the need for digitalization in the fields of politics, economy, culture, social processes to provide their population with basic services.

The economy has always been a digital space in a certain sense: economic terminology is connected with digits, and only with the help of digits it is possible to show the results of doing business. Though economy uses quite a lot of terms such as profit, loss, income, expense, tax base, inflation growth (decrease), GDP volume and many others, these terms make sense only if they have numeric expression.

Any digital data is processed and documented. The results obtained are used to develop and approve the country's economic policy. If this policy is successfully implemented, the state's finances and economy are developing.

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The current stage of digital communication systems development is characterized by the formation of a progressive information environment which is based on the use of digital currencies, the move of economic ties to a virtual basis, the fall of demand for an impressive transport infrastructure, the reduction of business costs and the disappearance of traditional markets. This all happens due to the processes of economy digitalization.

The concept of “digitalization” refers to the transition to modern models and methods of action that are based on information technology. Examples include communication via video and messengers, the implementation of the idea of a “smart city”, the transition to electronic document management. Citizens are increasingly using the Internet for online consultations with specialists and making purchases.

To put is simply, digitalization is an economic activity that is based on the creation, distribution and application of digital technologies, as well as related products and services. The development of the digital economy primarily influences the mode of work of companies; social activities and education; ways of communication between the state and citizens, including the provision of important services.

Due to the enhancement of digital technologies the number of innovations is increasing, brand new business management models are introduced and new ways of implementing investment strategies are being launched. The financial industry is a leader in digitalization, which manifests itself in the emergence and development of such things as online banking and electronic payments. People and companies consult investment robot advisors, use crowdfunding, scoring models for credit risk assessment, cloud storage of information, P2P lending and blockchain, and invest money in cryptocurrencies.

Companies use digital technologies to manage, control and analyse their business, as well as to sell their services or goods. Most financial products can be obtained online, for example, to apply for a loan, pay a bill or invest funds.

Society takes it for granted that it is possible to pay taxes and make other payments just using a smartphone. To get a loan, you need to visit the bank’s website and submit an application. The availability of the Internet and the level of development of digital technologies allows you to manage finances regardless of place and time.

Today digitalization concerns almost every sphere of human activity, with some areas being more flexible and, as a result, advanced due to global socio-economic processes. Higher education proved to be one of the spheres where digitalization accelerated reforms and led to creating a new image of universities presented in their websites. Research into university websites within discourse analysis framework will allow tracing the manifestations of digitalization as well as ways of achieving a higher level of digital transformation and adopting digital technologies for the benefit of national economy.

2 Main part

2.1 Overview of digitalization of economy

2.1.1 Digitalization of economy: latest trends

Digitalization is described as “a broad swath of digital tools and infrastructure (e.g. 3D printing, data analytics, mobile computing, etc.)” [1: 224] that can lead to a wide range of innovations outputs for multiple application contexts. Digitalization can lead to significant changes in the organization and innovations in industry, as well as in the regional and national economy. Digitalization includes common technologies that can be applied in many areas of industry and society.

Digital technologies are changing everything and their impact on all human activity will only increase. Digital transformation serves as the basis of modern transformations in the economy of the Russian Federation; that is why it is studied within the framework of economic theory which provides correct explanation of interrelated economic, social, industrial and financial phenomena, and, accordingly, can correctly forecast and propose ways and strategies for future economic development.

As the research conducted by the Higher School of Economics [2] shows, the costs of developing the digital economy in 2021 in the Russian Federation amounted to 4848 billion roubles, which is 1524 billion roubles more than the same indicator in 2017 (+31.4%). At the same time, the share of organizations accounted for 52.3 and 60.8% in 2017 and 2021, respectively. In general, organizations in almost all types of economic activity have advanced their access to the Internet. The top 5 types of economic activity with fixed broadband Internet access are shown in Table 1 [2].

Table 1. Fixed broadband Internet access in organizations by types of economic activity – top 5 types of economic activity (in descending order) (in per cent of the total number of organizations).

Type of economic activity	*Total*		*With the maximum speed of access*					
			256 Kbit/s-1.9 Mbit/s		2.0-100.0 Mbit/s		Over 100 Mbit/s	
	2020	2021	2020	2021	2020	2021	2020	2021
Total	**73.0**	**73.8**	**10.4**	**8.3**	**51.3**	**53.2**	**11.3**	**12.3**
Higher education	45.9	47.1	27.7	31.5	35.6	31.9	17.1	19.7
Medical care and medical services	82.5	81.5	7.9.	6.9	67.5	66.8	7.1	7.8
Information technologies	81.2	80.5	4.4	3.8	53.3	49.8	23.5	26.9
Financial sector	79.6	78.7	3.2	3.2	57.3	54.4	19.3	21.1
Wholesale and retail	79.5	80.4	16.1	7.1	47.2	56.7	6.3	16.6

As the data show, the use of high speed Internet among organizations is steadily growing. The top 4 kinds of digital services used by organizations are (Fig. 1) [2].

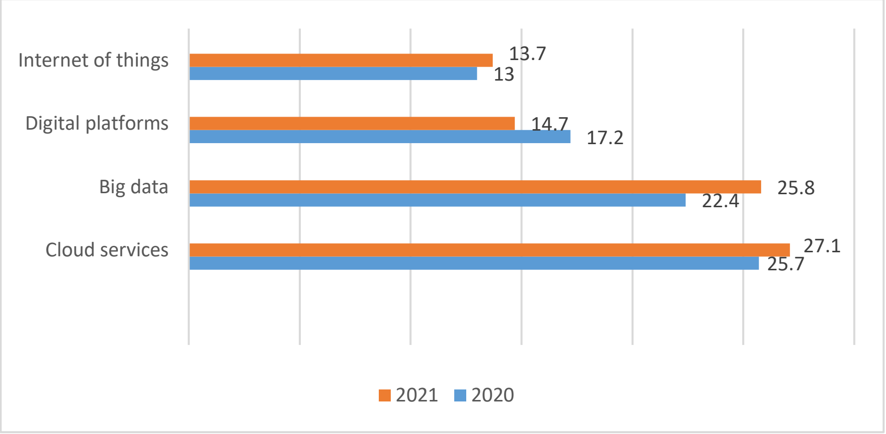

Fig. 1. Kinds of digital services used by organizations

Depending on the type of economic activity, organizations use digital technologies for various purposes (see Table 2) [2].

Table 2. Ways of using of digital technologies by types of economic activity (in per cent of the total number of organizations).

	Cloud services		Big data collection, processing and analysis		Digital platforms		Internet of things	
	2020	2021	2020	2021	2020	2021	2020	2021
Total	**25.7**	**27.1**	**22.4**	**25.8**	**17.2**	**14.7**	**13.0**	**13.7**
Higher education	45.9	47.1	27.7	31.5	35.6	31.9	17.1	19.7
Financial sector	41.0	38.9	44.4	45.5	36.3	33.2	10.8	11.2
Wholesale and retail	38.3	39.8	25.9	32.3	30.3	24.6	24.4	23.0
Information technologies	34.6	37.3	29.5	33.3	24.2	23.2	12.8	13.7
Medical care and medical services	32.6	34.0	27.2	30.6	18.3	16.5	13.8	15.1

It is quite obvious that the process of digitalization of economy in Russia will be further developing to keep up with the latest global trends. The proposed study will investigate the leading sector as presented above, i.e. higher education. It is our hypothesis that over the past years, institutions of higher education have become one the most advanced group of users of digital services, which is stipulated both by the global digital drive and the COVID-19 pandemic. Being forced to provide educational services in a distant mode, universities, in a rather limited time framework, have developed new ways of teaching as well as interacting with students, some of which are sure to stay in post-pandemic higher education [3].

2.1.2 Digitalization of higher education

Digitalization of higher education has become one of the leading trends of digitalization of economy. The modern period is characterized by qualitative changes (introduction of artificial intelligence, block chain, work with big data bases, etc.) rather than quantitative (the spread of digital platforms, mass computerization of education).

Digital strategy for higher education proposed by Cisco Systems, Inc., includes [4] (Fig. 2):

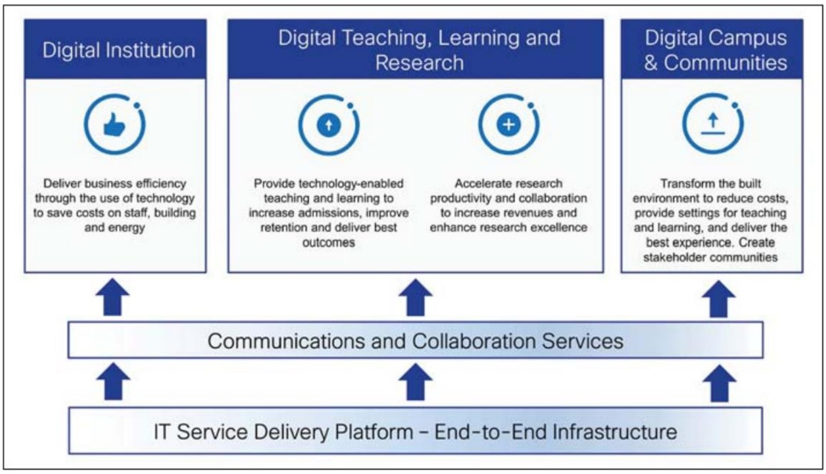

Fig. 2. Components of a digital strategy for higher education

According to the strategy presented above, and taking into consideration the goals of the National Project "Digital Economy" [5], E. Plotnikova and M. Ephraim developed a system of indicators to evaluate the level of digitalization of universities [6] (Table 3). We believe that these indicators can be viewed as focal areas universities need to focus on to meet the requirements that modern digital environment imposes on higher education worldwide.

Table 3. Digitalization factors of higher education institutions

№	*Digitalization factors*	*Digitalization indicators*
1	Specialized study programmes	Number of skill enhancement programmes and professional re-training programmes for teachers in the area of digitalization
		The existence of the department of digital economy
2	Information infrastructure	Availability of digital services (3D tour of the university, QR-technology, online news, online payment options)
		Number of online courses in open educational platforms
		Availability of personal accounts of staff, students, teachers, enrollees
3	Development of research competences including the level of academic publications	Number of publications in electronic library
		Number of published journals including those indexed in international data bases
		Number of academic publications in electronic library
		Number of the articles the staff published in international journals
4	Social effect of digitalization	Customer satisfaction of digital services
5	Economic indices of digitalization	Investment in digital economy
		Non-cash payments using digital technologies
		Receipts from digital services

Thus, we may conclude that there are three major vectors in the digital transformation of higher education:

- The development of digital infrastructure of higher education – creating a digital environment;

- The development of digital teaching materials, tools and services, including digital assessment techniques;
- The development and dissemination of new models of learning environment.

Despite the fact that digitalization of higher education is considered to be a priority sector of digitalization of economy, there is still no national system of evaluation of the level of digitalization applied to universities. Some researchers provide general data demonstrating the major trends and achievements in the implementation of digital services in higher education institutions across Russia (Fig. 4) [7].

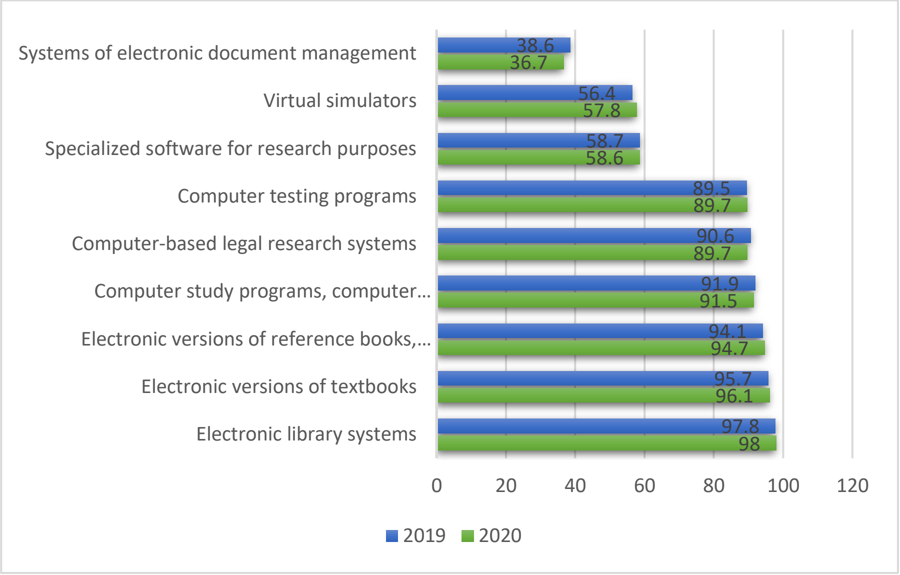

Fig. 4. Use of specialized software available for students and staff in institutions of higher education

The data show that digitalization has become an integral part of the system of higher education in Russia. The analysis of the websites of three leading Russian universities conducted within the framework of discourse analysis will demonstrate the latest trends typical of Russian universities, thus proving the hypothesis of the presented study.

2.2 Discourse analysis as a research framework

Discourse analysis in a general sense combines a number of approaches in the social sciences, aimed at conducting a critical study of discourse which involves analyzing the ways of applying mental schemes to the modes text perception; while considering the balance of forces in society, and implementing a normative approach to their formulation, it becomes possible to critically analyze these relations in connection with social changes.

Discourse analysis is not just one of the methods of studying a certain problem through a specific way of analyzing discourse, but an integral complex that includes philosophical (ontological and epistemological) prerequisites concerning the role of language in the social structures of the world; theoretical models and methodology of how to choose an approach to the study of the problem; specific methods of analysis.

Discourse analysis follows a certain logic of development. In the middle of the twentieth century, it was mainly understood as a connected sequence of sentences or speech acts, a certain text that influenced people's behavior. Thus, we may assume that the linguistic approach played a leading role. Over time, it has been supplemented by sociocultural, sociological, psychological, post-structuralism and other approaches. Today discourse is understood and considered not only as an oral or written text, taking into account mainly the verbal component, but also as an integral communicative phenomenon and its product, a complex system of the hierarchy of knowledge, including, in addition to the text, also extra-linguistic, social and other factors (knowledge about the world, opinions, attitudes, goals of the addressee, etc.) necessary for understanding the text.

One of the important areas of discourse studies is "critical discourse analysis" (CDA) developed by T. van Dijk, N. Fairclough [8; 9]. The focus of critical discourse analysis is on the role of discourse practice in maintaining social order and implementing social change.

Currently, discourse analysis is perceived as an interdisciplinary approach that has taken shape at the junction of sociolinguistics and linguistic-cultural studies, but has absorbed the techniques and methods of various humanities sciences: rhetoric, linguistics, philosophy, psychology, political science, sociology, etc.

Discourse analysis as a research method requires following a certain succession of research steps and procedures which include the analysis of the text, the analysis of discourse practices and the analysis of social practices [10]. For the presented analysis we have chosen the English-language versions of the official websites of three leading Russian universities, which take the first three positions in the National Rating of Universities [11]. Over the period of 2018-2023, the first three positions in the overall rating have been occupied by the same three universities with the following score (Table 4):

Table 4. The best three universities in Russia according to the National Rating of Universities

№	*University*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*
1	Lomonosov Moscow State University	1000	1000	1000	1000	1000	1000
2	National Research Nuclear University MEPHI	971	951	963	946	925	935
3	The Moscow Institute of Physics and Technology	918	930	961	945	921	915

Viewing university websites not only as an example of the processes of digitalization of higher education but also as one of the types of computer-mediated communication and a hyper textual space, we propose to apply discourse analysis research framework to identify the nature, communicative strategies and specific language means involved in creating a positive image of the university. There is no denying the fact that prosperity and reputation of the university depend on how successfully the university discourse realizes its goals. In terms of digitalization, how effective is the linguistic image of the website in fulfilling the pragmatic functions of university websites.

2.3 Applying discourse analysis to the study of digitalization of economy

2.3.1 Analysing the discourse of university websites

Discourse of websites represents one of the most researched topics in modern linguistics due to the following reasons: from linguistic perspective, web-sites represent a combination of several types of discourse, which demonstrates their multidimensional and heterogeneous nature [12]; hyper textual space of web-sites fulfils several communicative functions – to provide information about the university, shape its image and attract prospective students, scholars, sponsors. The more informative and convenient in use the web-site is, the bigger community of users it is likely to have, which, in its turn, may prove to be useful in attracting potential customers, i.e. students as well as grant makers.

Let us start our analysis by describing discourse characteristics of university web-sites supported by examples taken from the official web-sites of the universities under study [14, 15, 16].

1. As far as discourse macro-structure is concerned, university websites represent a combination of several types of discourse: educational, science and advertising types [13]. At the same time, considering the mode of communication, discourse of web-sites is a variation of computer / Internet / virtual discourse. It is quite obvious that discourse of university websites is a hybrid type of discourse possessing certain features of every type mentioned above (Table 5).

Table 5. Examples of heterogeneous nature of the discourse of university websites

№	*University*	*educational discourse*	*science discourse*	*advertising discourse*	*virtual discourse*
1	Lomonosov Moscow State University (MSU)	Application and admission of international students	Information about Nobel Prize and Fields Medals Laureates from MSU	International recognition of MSU	MSU online, online tour of MSU
2	National Research Nuclear University (MEPhI)	MEPhI in facts: 15 campuses, 7200 students, global university	MEPhI generates scientific knowledge, disseminates and preserves it aiming to address global challenges of the 21st century	MEPhI's competitive advantage is its large-scale participation in international collaborations and projects.	Photo gallery Discover MEPhI (online tour)
3	The Moscow Institute of Physics and Technology (MIPT)	Choose your program: list of levels of study and information about them	Research partnerships (list of 79 universities and research centres)	Top-ranked university – Top 100 QS Mathematics, top 71 THE Physical science	PhunTech Long reads collection

2. Regarding discourse super-structure, university websites contain the same thematic elements though they may me named differently (Table 6)

Table 6. Super-structure of university websites

	Lomonosov Moscow State University (MSU)	*National Research Nuclear University (MEPhI)*	*The Moscow Institute of Physics and Technology (MIPT)*
Vertical menu	Home page General information Admissions and studies Further education Research priorities International cooperation Accommodation Campus life Online tour	About the university Academic programs Institutes Faculty and staff Our community Research news and events Contact us	Choose you program Top-ranked university Environment to inspire Global context Alumni community
Horizontal menu	MSU online Addresses Site map Search	Students Alumni Faculty and staff News and events Admissions	Why MIPT? Programs How to apply Campus life Preparations programs Contacts APPLY NOW
Digital features	Main page advertising Russian / English / Chinese version of the website; Links to: VK page of MSU MSU Telegram channel Yandex Dzen MSU page YouTube channel; Website version for the visually impaired	Main page changing advertising; Russian / English versions of the website; Links to: YouTube channel University e-mail; Additional links to: EdX courses Russian academic excellence project Russian scholarship project University contacts	Main page changing advertising; Russian / English versions of the website; FAQ; Apply now / Request info options; Links to: University e-mail YouTube channel VK page of MIPI Google maps

2.3.2 Language features of university websites

We will now proceed with defining specific language means used in university websites aimed at realizing the pragmatic functions of websites. Bearing in mind that university websites serve as an important channel of fast and effective communication of universities with their target audiences, the discourse of university websites has clearly expressed pragmatic focus, which determines the communicative strategies used in the linguistic design of university websites. The strategies include [12]:

Informative	*Modal-evaluative*	*Phatic*	*Regulative*
Used to reduce the level of uncertainty about the object of communication	Used to show the attitude to the object of communication, give subjective opinion	Used to produce favourable impression, win favour of the target audience	Used to coordinate educational process and the behaviour of its participants
Language means: exact numbers, dates, facts; quotations; mentioning famous people connected with university	Language means: positive connotation nouns, adjectives; superlative adjectives; metaphors; exclamations and questions, imperative mood	Language means: greetings, addresses; current use of 'you' and 'we' pronouns	Language means: modal verbs, means of giving instructions - it is necessary to ..., you need to ...

Fig. 5. Communicative strategies and language means used in university website discourse

The table below presents examples of language means used to realize the communicative strategies described above taken from the websites of the universities under study.

Table 7. Means of verbalization of pragmatic functions of university websites

	Lomonosov Moscow State University (MSU)	*National Research Nuclear University (MEPhI)*	*The Moscow Institute of Physics and Technology (MIPT)*
Informative	Welcome to Moscow State University, the **first Russian University founded** in **1755** on the initiative of **Mikhail Lomonosov**, an **outstanding scientist of the Enlightenment**, whose unsettled encyclopedic mind and energy gave the inner impetus to the project	The University traces its history back to the middle of **World War II.** It started off as the Moscow Mechanics Institute of Ammunition. The original charter was to train people for the nuclear industry, which had just begun to develop. The Head of the Soviet nuclear project, academician **Igor Vasilyevich Kurchatov** (yes, the “father of the atomic bomb”) – was one of the legendary University founders	Innovation infrastructure: **20+** on-campus food points, special delivery service, **20** minutes to Moscow, close location for daily shopping, **80** state-of-art labs. **36000+** alumni in **150+** countries

	The whole page is devoted to Nobel Prize Laureates from MSU. They include: N.N. Semenov, I.E. Tamm, I.M. Frank, B.L. Pasternak, L.D. Landau, A.M. Prokhorov, P.L. Kapitsa, M.S. Gorbachev, A.D. Sakharov, V.L. Ginzburg, A.A. Abrikosov. A separate page contains information about the scientists of MSU – Fields Medal winners M.L. Kontsevich, S.P. Novikov, G.A. Margulis, V.G. Drinfel'd, A.Y. Okunkov V.A. Voevodsky	A separate page is devoted to the Nobel Prize Laureates who studied and / or worked at MEPhI: Nicolay Basov, Nikolay Semenov, Pavel Cherenkov, Igor Tamm, Andrey Sakharov, Ilya Frank. Besides, the page *Facts and Figures* contains information about the position of the university in various international and natinal rankings	A separate page is devoted to Phystech Code which consists of 4 items: support for talentded students, the Phystech system, top-notch scientific community and spirit of entrepreneurship. *Spirit of Entrepreneurship* The curriculum is geared toward equipping students with profound knowledge and up-to-date practical skills: - entrepreneurship projects are part of the educational process - our own Phystech.Start business accelerator offers numerous support programs - MIPT is the alma mater of **billionaires**, with **10** alums on the top **200** ranking of ***Forbes Russia***
Modal-evaluative	Yet the **major commitment** remains the same as it has been in centuries: to provide **outstanding teaching, scholarship and research**.But what makes our University so lively is this **intellectual spirit** combined with **inexhaustible curiosity**	MEPhI empowers the world's **best** nuclear technology experts and **talented** students to produce secure and stable energy, excel in creating applied sciences, **boost human capital** and economic output in various fields, support industry and business, and be **innovative** and **creative** – as much as they want and can	**Why take MIPT preparatory program?** - **Upgrade** your skills in mathematics, physics, informatics and chemistry - **Enjoy** the accommodation on the MIPT campus - **Build** a strong network with fellow MIPT students and professors
Phatic	**We** work hard to preserve our heritage and develop our traditions of a comprehensive approach to higher education and science. **We** keep open the University doors to anyone who strives for new discoveries, creativity, and self-improvement	**We** aim to forge innovative partnerships, strike a balance between tradition and technology, demonstrate value and become competitive in an increasingly globalized world	Our yachting club exists since the founding of MITP. **We** have been leaders before, and **we** are fighting for the leadership position not only in student, but also in Moscow sailing sport
Regulative	BEFORE uploading the document online or coming to Moscow, the applicants **should** contact the faculty	**In order to** increase your chances of becoming our students, choose MEPhI as the first university at this priority list!	Notice, **it is necessary to** pass the interview to be enrolled on some programs

3 Conclusion

As the research show, universities have managed to become one of leaders of digitalization of economy. Mass adoption of digital technologies increases their competitiveness proved by the results of discourse analysis of university websites, which revealed competent utilization of a number of language means and communicative strategies which contribute to the promotion of universities in national and global educational environment.

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