Education in the Asia-Pacific Region:
Issues, Concerns and Prospects 65

Elena G. Popkova
Bruno S. Sergi *Editors*

Digital Education in Russia and Central Asia

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Education in the Asia-Pacific Region: Issues, Concerns and Prospects

Volume 65

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Elena G. Popkova · Bruno S. Sergi
Editors

Digital Education in Russia and Central Asia

Springer

Editors
Elena G. Popkova
MGIMO University
Moscow, Russia

Bruno S. Sergi
University of Messina
Messina, Italy

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Series Editors' Introduction

The increasing pervasiveness of the internet has, and is, having a great impact on all aspects of life worldwide. This is certainly the case in the area of education and schooling, where the increasing use of the internet is impacting on all aspects of teaching and learning. An example is the impact of the COVID 19 pandemic, which has resulted in increasing number of learners learning from home, through the adoption of digital education.

Digital education has proved to be particularly attractive to many universities. A key reason is that it allows for a large increase in the production capacity of universities and provides full and equal access to higher education services for a large population of learners. Digital learning enables lifelong learning and access to the education services of leading education institutions for everyone, including people in rural and remote areas.

This edited book by Elena Popkova and Bruno Sergi, on *Digital Education in Russia and Central Asia,* provides a comprehensive study of a new global trend of higher education, that of the digitalization of universities' activities, with specific reference to Russia and countries in Central Asia. This volume is published in the long-standing Springer Book Series 'Education in the Asia Pacific Region: Issues, Concerns and Prospects'. The first book in this Springer international series was published 20 years ago, in 2002, the book by Popkova and Sergi being the 65th volume to be published to date in the series

This book provides a comprehensive examination of the importance of digital education in Russia and Central Asia. Although, as the contributors to this book point out, Central Asia and Russia have 'a unique cultural flair', many of the ideas and recommendations presented here are highly relevant to other countries, which are also exploring the relevance and benefits of educational technology and digital education.

The 46 chapters in the book are organized into four parts that examine, with regard to Central Asia and Russia: the contribution of digital education to cultural inclusivity and the development of international education; the role of digital higher education for sustainable development; the advantages of digital higher education for labour market optimization and the employment of youth; and current directions

of digitalisation and educational technology and there contribution to an increase in the quality and effectiveness of higher education.

In terms of the Springer Book Series in which this volume is published, the various topics examined in the series are wide-ranging and varied in coverage, with an emphasis on cutting edge developments, best practices and educational innovations for development. Topics examined to date in the series include: environmental education and education for sustainable development; the interaction between technology and education; the reform of primary, secondary and teacher education; innovative approaches to education assessment; alternative education; most effective ways to achieve quality and highly relevant education for all; active ageing through active learning; case studies of education and schooling systems in various countries in the region; cross-country and cross-cultural studies of education and schooling; and the sociology of teachers as an occupational group, to mention just a few. More information about the book series is available at http://www.springer.com/series/5888.

All volumes in the series aim to meet the interests and priorities of a diverse education audience including researchers, policymakers and practitioners; tertiary students; teachers at all levels within education systems; and members of the public who are interested in better understanding cutting edge developments in education and schooling in Asia-Pacific. The main reason why this series has been devoted exclusively to examining various aspects of education and schooling in the Asia-pacific region is that this is a particularly challenging and dynamic region. It is renowned for its size, diversity and complexity, whether it is geographical, socio-economic, cultural, political or developmental. Education and schooling in countries throughout the region impact on every aspect of people's lives, including employment, labour force considerations, education and training, cultural orientation, and attitudes and values. Asia and the Pacific are home to some 63% of the world's population of 7 billion. Countries with the largest populations (China, 1.4 Billion; India, 1.3 Billion) and the most rapidly growing mega-cities are to be found in the region, as are countries with relatively small populations (Bhutan, 755,000; the island of Niue, 1,600).

Levels of economic and socio-political development vary widely, with some of the richest countries (such as Japan) and some of the poorest countries on earth (such as Bangladesh). Asia contains the largest number of poor of any region in the world, the incidence of those living below the poverty line remaining as high as 40% in some countries in Asia. At the same time, many countries in Asia are experiencing a period of great economic growth and social development. However, inclusive growth remains elusive, as does growth that is sustainable and does not destroy the quality of the environment. The growing prominence of Asian economies and corporations, together with globalisation and technological innovation, is leading to long-term changes in trade, business and labour markets, to the sociology of populations within (and between) countries. There is a rebalancing of power, centred on Asia and the Pacific region, with the Asian Development Bank in Manila declaring that the twenty-first century will be 'the Century of Asia Pacific'.

We know from comprehensive feedback received from numerous education researchers, policymakers and practitioners, worldwide, that this book series makes a useful contribution to knowledge sharing about cutting edge developments concerning education and schooling in Asia Pacific.

Any readers of this or other volumes in the series who have an idea for writing or co-writing their own book (or editing/co-editing a book), on any aspect of education and/or schooling, relevant to the Asia Pacific region, are enthusiastically encouraged to approach the series editor either direct, or through Springer, to publish their own volume in the series. We are always willing to assist perspective authors to shape their manuscripts in ways that make them suitable for publication.

May 2022

Rupert Maclean
Schools of Education
University of Tasmania
Hobart, Australia

RMIT University
Melbourne, Australia

Introduction: A Systemic View at the Specifics of Russia and Central Asia, Their Modern Capabilities and Advantages of Digital Higher Education

Central Asia is a unique region of the world, which is especially interesting from the positions of the research of higher education. This book aimed to study and take into account the specific features of this region. One of the features of Central Asia is that it is a very large territory, being an important part of the world community. Though the borders of Central Asia are not very clear, regardless of the approach to the determination of this border, the population of this region is very large. Even in the "narrow" treatment (according to Britannica, 2021), according to which Central Asia includes only countries, which are located entirely on the territory of this region—Kazakhstan, Kyrgyzstan, Uzbekistan, Turkmenistan and Tajikistan—this region's population, according to the UN (2021), is 1% of the planet's population.

According to the "wide" treatment (UNESCO, 2021), Central Asia includes (in addition to the above countries) also countries in which territory is partly located in this region—Mongolia, Afghanistan, Iran, Pakistan, India (17% of the world population), China (20.1% of the world population) and Russia (1.9% of the world population). A special place in the structure of Central Asia belongs to Russia. Unlike other countries, which belong entirely to Asia, a large part of Russia's territory is located in Europe. That's why, to emphasise the use of the "wide" treatment, Russia is mentioned separately in the book's title, though, in reality, we consider Russia as a part of Central Asia (one of the countries of this region).

Another specific feature is the unique cultural flair of Central Asia, which has been preserved and is clearly expressed at present time, despite the long and active participation of the region's countries in the processes of globalisation. Central Asia is an extraordinary mixture of different confessions, languages, forms of social mode, legal systems, and economic models. The notability of Central Asia consists of the prominent loyalty and openness of its cultures. Despite the large diversity, these cultures, for the most part, do not have conflicts with each other but co-exist peacefully.

This peculiarity makes the conditions for the international cooperation of countries of Central Asia in the sphere of higher education especially favourable, and the experience of this cooperation—significant and attractive for the rest of the world (other

regions of the world economy). However, the differentiation of cultures (multiculturality) creates berries on the path of development of international higher education, which have to be thoroughly studied and overcome.

The specific features of Central Asia include also a large share of youth in the structure of the population. This is what clearly distinguishes Central Asia as compared to "ageing" societies (e.g., peculiar for Europe) and determines the specifics of higher education. While higher education in Europe moves towards secondary training of personnel (lifelong learning), the key task of higher education in Central Asia is the primary training of personnel, i.e., training of youth and supporting employment.

Another feature, which should be taken into account when studying higher education, is the increasing instability in Central Asia and, accordingly, the growing risks for sustainable development. Here, it is necessary to mention the changes that took place in Afghanistan in 2021. Though the consequences of the change of power in this country are yet to be assessed, it is obvious that the risks of implementing SDG 5 (the problem of gender inequalities, in particular in the sphere of higher education, grew) SDG 16 (social institutions are being transformed, which temporarily reduces their effectiveness), and other sustainable development goals have increased.

The purpose of this book is the comprehensive study of the above specific features of Central Asia and their reconsideration from the positions of a new global trend of higher education—digitalisation of universities' activities. We strive to show that digital higher education for Central Asia is not just joining the global trend, but something more—a possibility to use its own specifics winningly and obtain advantages from them.

Thus, digital higher education allows for a large increase in the production capacity of universities and the provision of full and equal access to higher education services for the large population of Central Asia. Lifelong learning and access to educational services of the region's leading universities are available—due to digital learning—for everyone, including people from remote rural territories. The digital environment also offers expanded opportunities for the development of international higher education: mutual recognition of diplomas on higher education in countries of Central Asia, traineeship for undergraduates and lecturers in various universities of the region, exchange of experience, scientific and educational cooperation, etc.

Digital learning allows achieving the largest flexibility and adaptability of educational programs and educational process, to individualise it and make it very attractive and effective for training of youth. The advantages of digital higher education include the possibility to use it to reduce the cultural differences and instability through independent (isolated—in the digital environment) training of social categories that cannot and do not want—due to certain reasons—to study with a general group of students. This should be considered as a forced measure, e.g., for combining work and studies and for supporting the implementation of the SDGs (reduction of sustainable development risks).

The modern opportunities and advantages of digital higher education, set onto the specifics of Central Asia, are studied consecutively in the four parts of this book. The first part considers the contribution of digital education to the cultural inclusivity and development of international education in Central Asia and Russia. The second part

elaborates on the role of digital higher education for the sustainable development of regions in Central Asia and Russia. The third part is devoted to the advantages of digital higher education for the optimisation of the labour market and employment of youth in Central Asia and Russia. In the fourth part, the authors determine the current directions of digitalisation (EdTech) and their contribution to the increase in quality and effectiveness of higher education in Central Asia and Russia.

The primary target audience of the book includes scholars who specialise in such spheres as digital higher education, EdTech, modernisation of universities and higher education in Russia and Central Asia. For them, the book forms a systemic scientific view of the opportunities and perspectives of the development of digital higher education in Russia and other countries of Central Asia in light of the specifics of this region of the world. The multidisciplinary character of the book makes it attractive for representatives of different scientific spheres, including pedagogics, cultural sciences, law, management in higher education, environmental and regional economics, and information technologies in higher education.

The secondary audience includes subjects of managing the development of digital higher education in Central Asia: supranational organisations (e.g., the Eurasian Economic Commission), national regulators of higher education and representatives of the universities' management. The book will provide them with applied recommendations on the improvement of managing the digitalisation of higher education in Central Asia.

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Part I
The Contribution of Digital Education to Cultural Inclusivity and Development of International Education in Central Asia and Russia

Chapter 1
Integration of the Higher Education Systems of Russia and the Republic of Uzbekistan in Training for the Digital Economy

Lyubov I. Vanchukhina, Tatyana B. Leybert, Shakhlo T. Ergasheva, Elvira A. Khalikova, and Ilnara R. Khanafieva

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1.1 Introduction

In current conditions, the improvement of the educational system is closely connected with the introduction of new digital technologies to implement individually oriented learning. The Republic of Uzbekistan declared 2020 as the year of the digital economy. The government developed a set of measures to actively develop the digital economy by introducing modern information and communication technologies in all sectors and areas, primarily in public administration, education, and the health system (President of the Republic of Uzbekistan, 2020).

In order to improve the national system of higher education in the Republic of Uzbekistan, the government has set the goals to improve the quality of training for the digital economy. Personnel will possess advanced digital competencies and apply their knowledge to improve the efficiency of public administration, economy, and social sphere. In this regard, the Republic of Uzbekistan developed and adopted several normative legal acts.

The new law "On Education," approved by the Senate of the Republic of Uzbekistan on August 7, 2020, emphasizes the systematization of the educational process

L. I. Vanchukhina · T. B. Leybert · E. A. Khalikova (✉) · I. R. Khanafieva
Ufa State Petroleum Technological University, Ufa, Russia

I. R. Khanafieva
e-mail: ilnarak18@bk.ru

S. T. Ergasheva
Tashkent State Economic University, Tashkent, Uzbekistan

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to ensure the acquisition of deep theoretical knowledge, practical skills, and professional competencies to perform professional tasks in accordance with the needs of the government and business (Uzbekistan Republic, 2020).

According to the "Concept of development of higher education system of the Republic of Uzbekistan until 2030," approved on October 8, 2019, the key objectives of improving the quality of education and meeting the needs of highly qualified personnel for the digital economy are the integration of science, education, and production, as well as the development of international cooperation between educational institutions (President of the Republic of Uzbekistan, 2019). Figure 1.1 presents the main priority areas of developing the higher education system in the Republic of Uzbekistan following the provisions of the concept (President of the Republic of Uzbekistan, 2019).

It is impossible to improve the quality of students' training without improving traditional training techniques and implementing advanced ones. This necessitates the use of new technologies in the educational process: information, telecommunications, and IT technologies, which are currently an integral component of training.

The development of science, education, and digital economy in Uzbekistan, as well as support for information and communication technologies, will be one of the

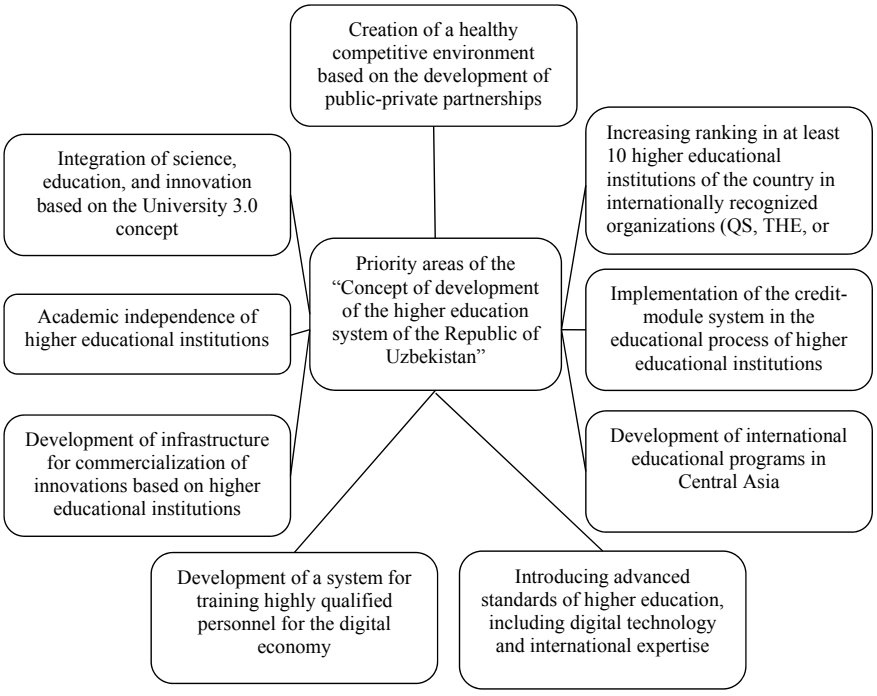

Fig. 1.1 Priority areas of the "Concept of development of the higher education system of the Republic of Uzbekistan". *Source* President of the Republic of Uzbekistan (2019)

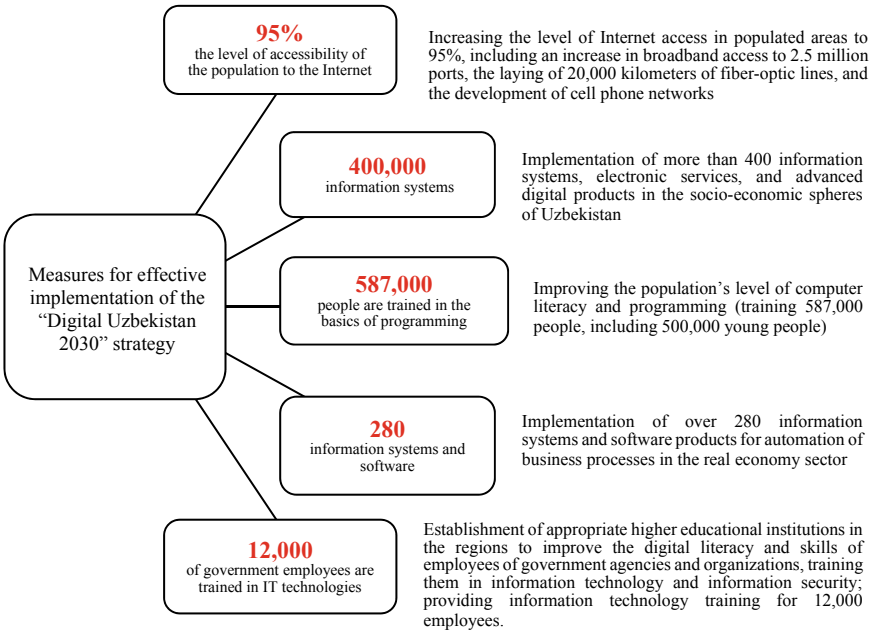

Fig. 1.2 Comprehensive measures aimed at implementing the "Digital Uzbekistan 2030" strategy. *Source* President of the Republic of Uzbekistan (2020)

priority issues of state policy. The plan for the development of Uzbekistan for the near future includes provisions for implementing elements of e-government and support for the digital economy.

According to the "Digital Uzbekistan—2030," approved by the presidential decree on October 5, 2020, the implementation of comprehensive measures aimed at implementing new projects in the digital economy is envisaged within the digital transformation of regions and sectors of the economy (Fig. 1.2).

As noted by Uzbek scholars Ergasheva (2018) and Sharipov (2020), the training of highly educated and competent personnel for industries depends on the quality of the educational process, organized with the involvement of teaching staff possessing knowledge of digital technology and training for the digital economy. This is primarily determined by the correspondence of the system of vocational education with the needs of the policy of the Republic of Uzbekistan in the field of digitalization.

Following the established strategic objectives for the development of the digital economy, the leading university for training highly qualified personnel for the economy of Uzbekistan, Tashkent State University of Economics, introduced a credit-module system for undergraduate and graduate students implemented from the academic year 2020–2021. This system allows building an individual trajectory of students following the requirements of the business community and the new realities of the digital economy. Moreover, it attracts leading practitioners and educators from foreign educational institutions to conduct lectures and practical classes.

As part of the development of the partnership between Uzbekistan and Russia, the authors propose a new model for integrating higher education systems to prepare economists for the Republic of Uzbekistan with digital competencies. The proposed model is based on the network interaction between the Tashkent State University of Economics and the Ufa State Petroleum Technological University. This model allows implementing a joint master's program in the format of dual degrees.

1.2 Materials and Methods

Digitalization is one of the most striking manifestations of the transformation of society and business. Digitalization penetrates virtually all areas of activity. Digitalization is considered the main driver of the country's economic growth, and the digital economy is the main global trend.

A series of scientific publications led by Prof. E. G. Popkova (Popkova & Gulzat, 2020; Popkova & Sergi, 2020; Popkova et al., 2021) is dedicated to the forecasts of economic development until 2030, mainly related to the "smart" economy and digitalization. These scientific publications consider the stages of the transformation of society and business through digital technology, which significantly impact future business strategies, business models, and business processes. In the context of global digitalization, companies, organizations, and financial institutions are already experiencing an urgent need for specialists with a new type of thinking, formed digital competencies, readiness to perceive innovations, and the ability to retrain rapidly.

The analytical report of the Corporate University of Sberbank, compiled on the materials of the III International Conference (Katkalo et al., 2018), discloses the models of digital conferences, including user and professional skills of working with software and tools.

These aspects significantly impact the application of modern learning models and the transformation of the education system, involving digital technologies and distance learning. Thus, a group of Russian educators suggests using a competency-based model of in-service training in the enterprise (Sekerin et al., 2018). In the research led by Prof. L. I. Vanchukhina (2019), the authors propose a new training format—the dual degree model. This model provides students with the opportunity to study two programs at the same time.

The above principles form the basis for developing the master's program "Financial Technology in the Digital Economy" with the dual degree model. In 2020, students of the Republic of Uzbekistan will have a unique opportunity to simultaneously enter two universities—the Tashkent State University of Economics (TSUE) on the master's program "Accounting (by industry and field)" and the Ufa State Petroleum Technological University (USPTU) on the program "Financial Technology in the Digital Economy." An important feature of the master's program is that it is intended for university entrants with no special training in information and IT technology who want to master digital competencies. Table 1.1 presents a set

Table 1.1 Competencies of a future economist acquired during the dual-degree master's program "Financial Technology in the Digital Economy"

Digital skills	Soft skills
Use modern information systems to manage a company	Develop projects based on company requests
Collect, structure, and process accounting information	Public speaking and defending projects
Work in "1C: Enterprise" and SAP ERP programs	Develop systematic, critical, and analytical thinking
Process and analyze large amounts of data (big data)	Develop strategic vision and perspective thinking
Develop technical specifications for the design of software for managing business processes in companies	Solve the tasks set
Analyze and forecast the production and financial performance of companies	Make decisions and evaluate them critically
Draw up management and analytical reports of companies	
Develop software modules and add-ons in software products based on SAP ERP, SAP 1C, and blockchain technology to solve management problems in companies	
Model and analyze business processes in companies using ICT tools	

Source Compiled by the authors

of two groups of competencies acquired during the dual degree program "Financial Technology in the Digital Economy."

Within the framework of the master's program, it is planned to study the profile disciplines focused on the following:

- Operations with big data ("Analysis of unstructured data (Big Data) in the digital economy," "Development of databases and databank in economic information systems," "Cloud technologies in the digital economy");
- Latest financial technologies ("Asset storage using blockchain technologies");
- Modern information systems ("The use of ERP systems in the digital economy," "Electronic document management system");
- E-business organization systems ("Digital business strategies and e-commerce technologies").

It is planned to implement a unified curriculum, the disciplines of which are distributed between the two universities. Figure 1.3 schematically presents the model of training in the format of dual degrees in the master's program "Financial Technologies in the Digital Economy."

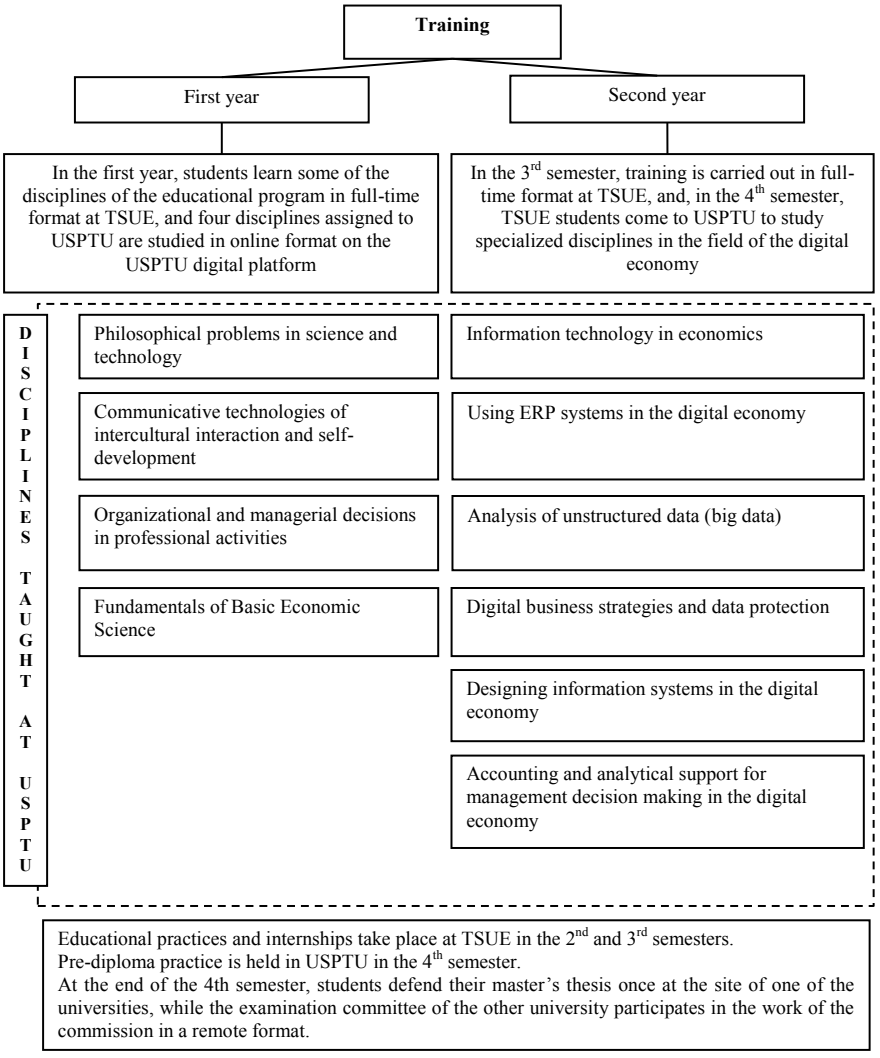

Fig. 1.3 Scheme of implementing the model of training in the format of dual degrees in the master's program "Financial Technologies in the Digital Economy." *Source* Compiled by the authors

In the first year, students learn some of the disciplines of the educational program in full-time format at TSUE, and four disciplines assigned to USPTU are studied in online format on the USPTU digital platform. In the third semester, training is carried out in full-time format at TSUE, and in the fourth semester, TSUE students come to USPTU to study specialized disciplines in the field of the digital economy.

Educational practices and internships are held at TSUE in the second and third semesters, and pre-graduation practices are held at USPTU in the fourth semester.

The master's thesis is written under the supervision of professors from TSUE and USPTU. At the end of the fourth semester, students defend the master's thesis in USPTU and once again in TSUE after they return to Uzbekistan (it is also possible to defend the thesis once at the site of one of the universities, with the examination committee of the other university involved in the commission in a remote format).

When graduating, Uzbek students will receive two diplomas of the Russian and Uzbek universities in the field of "Economics."

1.3 Results

The Ufa State Petroleum Technological University has considerable experience in training personnel for the digital economy. The Institute of Oil and Gas Business successfully trains master's degree students in Economics, profile "Financial and Information Technologies in the Digital Economy." Students in this program defend real projects for the digitalization of certain processes in enterprises and companies in the real economy and create software products for management decision-making based on digital platforms.

The graduation of masters in 2020 showed that the graduates of USNTU mastered the offered disciplines and became qualified users and developers of software solutions and products.

Interest in graduates of this master's program on the part of employers is confirmed by the fact that during the period of study, almost all master's students were hired by large companies, including companies engaged in IT. Ruslan Ismagilov, one of the graduates of the master's program "Financial and Information Technology," says the following: "Having received a bachelor's degree in economics from USNTU in the 'Finance and Credit' profile in 2018 and working as an intern at the company—SIBUR PJSC—I decided to get a master's degree in the new program—'Digital and Information Technologies in Economics.' Such terms as 'digital economy,' 'artificial intelligence,' 'big data,' 'neural network,' 'blockchain,' etc., were commonly used, and I had no idea what they meant. However, I understood that the labor market was changing and that certain technical skills give great opportunities for career growth. Additionally, a master's degree was required for some management positions. It is hard to combine work and study, but when I look back at my successes and activities, I realize that the years of graduate school are not only 'wonderful' but also a productive time. Getting the master's program, I have allocated the direction in which I want to develop—data analysis. While receiving certain knowledge in the university, the student must also study himself. I can confidentially say that the knowledge, experience, and skills gained in graduate school allow me to become a better professional. If I could go back in time and go to graduate school again, I would surely do it again. Studying on the bachelor's degree, I understood that my bar in data analysis is the analysis of the accounts of about 10 companies; on the master's degree, this number reaches 2 million."

Given the new demands and requirements of the business community for specialists, the authors of the article developed a curriculum for the master's program "Financial Technologies in the Digital Economy," the structure and content of which are presented in Table 1.2.

1.4 Conclusion

Thus, the proposed model of integration of higher education systems of Uzbekistan and Russia based on implementing a joint master's program for Uzbek students will allow them to receive two state diplomas simultaneously. Moreover, this program allows students to become skilled users of corporate information systems and developers of software solutions and IT products based on digital technologies (big data and blockchain).

Table 1.2 Curriculum of the master's program "Financial technology in the digital economy" in the format of dual degrees

Discipline	Distribution by courses and semesters															
	First year								Second year							
	First semester				Second semester				Third semester				Fourth semester			
	Lectures	Practical classes	Practicum	Credits	Lectures	Practical classes	Practicum	Credits	Lectures	Practical classes	Practicum	Credits	Lectures	Practical classes	Practicum	Credits
Disciplines for universal competencies																
Philosophical problems in science and technology (DLD*)					8	28		**3**								
Corporate management					6	26		**4**								
Communicative technologies of intercultural interaction and self-development (DLD)	4	26		**3**												
Foreign language of business and professional communication (DLD)						24		**3**								
Disciplines for general professional competencies																
International accounting practice and its regulation					6	26		**5**								
Quantitative research methods in accounting	8	38		**4**												
Management accounting (advanced level)	4	18	20	**4**												
Organizational psychology									6	26		**3**				
Fundamentals of basic economic science (DLD)	8	26		**3**												
Analysis of financial statements					8	26		**4**								
Provision of the reliability and authenticity of corporate reporting	6	24		**4**												
Disciplines for professional competencies																
Corporate financial reporting	18	26		**3**												
Methods of qualitative evaluations					18	26		**5**								
Elements of market accounting research									8	26		**3**				

(continued)

Table 1.2 (continued)

Discipline	Distribution by courses and semesters															
	First year								Second year							
	First semester				Second semester				Third semester				Fourth semester			
	Lectures	Practical classes	Practicum	Credits	Lectures	Practical classes	Practicum	Credits	Lectures	Practical classes	Practicum	Credits	Lectures	Practical classes	Practicum	Credits
Information technology in economics (1C)													4	18	20	**4**
ERP systems in the digital economy													8	46		**5**
Interdisciplinary perspectives on accounting									18	26		**3**				
Analysis of risks and their solutions									18	26		**3**				
Analysis of unstructured data (big data) in the digital economy													4	18	20	**4**
Digital business strategies and data protection													8	26		**3**
Designing information systems in the digital economy													18	26		**4**
Accounting and analytical support for management decision making in the digital economy													18	26		**4**
Internship and research work																
Educational practice (technological)								**6**								
Internship (technological)												**6**				
Pre-graduation practice (if needed)																**6**
Academic research work				**3**				**6**				**6**				**3**
State Final Examination																**3**
Total				**24**				**36**				**24**				**36**

*DLD—distance learning discipline

Source Compiled by the authors

Bold indicates disciplines for professional competencies are the main ones in the presented curriculum, they are necessary for the development of hard skills

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Chapter 2
Psychological Support of Students as a Direction of Development of Modern Digital Higher Education

Svetlana V. Khrebina, Anastasiya I. Vlasenko, Ekaterina A. Terenteva, Maksim V. Khrebin, and Roman N. Yundin

JEL Codes I230

2.1 Introduction

In the modern world, there has been a transformation in the values, life plans, and needs of people in general, and many of these facts are related to the coronavirus pandemic, which began in 2020 and affected the entire global community, including the student group. Completely new requirements to the personality and its various properties and qualities came to the fore: to its life orientation, position, self-consciousness, self-regulation of behavior, creative activity, as well as the ability to cope with the challenges of our time.

All this has led to the need for an accelerated transition to the digitalization of the higher education system, in which its main goal remains the formation of a creative, flexible, educated individual with a developed ability to actively transform reality.

The relevance of the study of the problem of students' psychological support in the new conditions of social distancing and self-isolation is due to the fact that young people are forced to increasingly immerse themselves in virtual reality and realize their needs there, including the need for communication. The task of a modern higher education institution is to increase the effectiveness of interaction with students, as many of them may face difficulties in adapting to the full transition to communication using various Internet services.

In these new conditions, the study of the problem of psychological support of students (their development, formation) is interdisciplinary, but its main issues are developed within the framework of pedagogical psychology (Asmolov, Gazman,

S. V. Khrebina · A. I. Vlasenko · E. A. Terenteva · M. V. Khrebin · R. N. Yundin (✉)
Pyatigorsk State University, Pyatigorsk, Russia
e-mail: jundin@pgu.ru

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Kotova, Petrovsky, Shiyanov, etc.). In the works of domestic psychologists, theoretical approaches to the described problem are considered, practical recommendations are given regarding the competent organization of the process of psychological support in higher education (touching on the issues of personal development and self-determination) (Abramova, Abulkhanova-Slavskaya, Asmolov, Vlasov, Volkova, Grishina, Dubrovina, Zagryadskaya, Lilienthal, etc.).

In these studies, we are primarily interested in the issue of supporting the student's personality in the context of digitalization of education. It is in this direction that new practical technologies for providing psychological assistance, psychological support, and assistance to the formation of an individual are being developed (Abramova, Belichev, Vlasov, Dubrovina, Zlyadskaya, Nedbayeva, Lilienthal, etc.).

However, the analysis of research on this problem suggests that the issues related to the psychological support of students at the stage of changes in the usual life reality, with the choice of the method of influence and, finally, with the conditions in the university environment necessary to increase the effectiveness of the process of psychological support, are still insufficiently developed.

In the psychological and pedagogical literature, it is pointed out that the issue of personal development of students in the conditions of transition to the distance education system is not sufficiently developed; methods and mechanisms of psychological support for students are not identified; a model of effective psychological support for students is not formed (Frantseva, 2003; Khrebina, 2011; Vasilenko, 2014). The relevance of this question, its insufficient theoretical development and, especially, its practical significance allow us to formulate the problem of our research: what is the model of psychological support for the development of a student's personality in the conditions of mass self-isolation and digitalization of education.

2.2 Materials and Methods

The purpose of the research is to study the specifics of students' psychological support in the conditions of digitalization of higher education.

To study the problem of students' psychological support in the conditions of digital higher education, we identified the following tasks:

(1) to analyze the research in the scientific psychological literature devoted to identifying the features of the organization of psychological support for students;
(2) to identify areas that are suitable for the practical organization of psychological support for students who are in forced isolation in the context of digital education;
(3) to determine the range of problems and features of students' activities in the period of transition to digital education, the specifics of their adaptation to the new conditions;

(4) to develop a working model of psychological support for students and to test it in the conditions of the remote educational process;
(5) to identify and describe the conditions necessary to improve the effectiveness of the process of psychological support for students who are in self-isolation.

The organization of psychological support of students assumes the need to take into account their age characteristics, namely: value orientations, the social situation of development, the main psychological neoplasms and crises that an individual must overcome for a successful transition to a new stage of life (Gamezo, 2001). However, in our opinion, it is also necessary to take into account the economic and social characteristics of living in a particular region of the country, which can have a significant impact on the formation of young men and women (after all, it is at this age that social factors come to the fore for the individual).

Thus, we have studied the features of the mental development and formation of students, the influence of various factors (biological, social, physiological, psychoemotional—external and internal), manifested in behavioral and personal characteristics, in their daily and academic life.

Age characteristics, as well as adaptation difficulties that arise in the educational environment, indicate the need to provide them with psychological support and organize the process of psychological support at all stages of training at the university. Based on the above, one of the hypotheses of our study was the possibility of the formation of social maladaptation of some categories of students in the context of digital education (Ananyev, 1980).

In order to study the adaptation processes of students during forced isolation, we used the following methods and techniques: the method of diagnosis of socio-psychological adaptation by Rogers and Diamond, modified by Osnitsky; the Spielberger–Khanin questionnaire; Personal Orientation Inventory by Shostrom, modified by Aleshina, Gozman, Zagika, Kroz.

The following methods were used: theoretical analysis (retrospective, comparative analysis, methods of generalization, systematization), qualitative and quantitative methods of interpreting the results.

2.3 Results

The analysis of the psychological literature shows that the problem of forced social distancing demonstrates the need for psychological support of students in the educational process of the university. However, this issue is currently only at the development stage.

All scientists involved in the study of psychological changes in the state of people in the conditions of self-isolation, note that quarantine measures have become a factor in increasing psychopathological symptoms caused by the deprivation conditions of the introduced regime (Spesintseva, 2009; Tkhostov & Rasskazova, 2020; Vlasenko, 2020). According to the results of the conducted studies and surveys,

during the coronavirus pandemic, people experience an increase in the level of anxiety, depression, disgust, increased chemical dependence, insomnia, somatization (constant "listening" to oneself in order to distinguish the symptoms of a cold or ARVI from a coronavirus infection, which develops into hypervigilance to physical malaise and a decrease in adequate perception of the level of health), emotional instability, obsessive–compulsive manifestations, phobic reactions, in some cases, symptoms of post-traumatic stress disorder and depression (Bland, 2020).

During the isolation of an individual from society, the feeling of loneliness increases, which contributes to the emergence of depressive and psychosomatic manifestations, and the mental and physiological state of the body worsens. Both teachers and students found themselves in a situation of drastic changes in living conditions, which affected their psychological state.

To study the adaptive capabilities of students in the situation of the pandemic and the transition to digital education, we formed a group of subjects (102 people, second-, third-, and fourth-year university students studying humanitarian science) and conducted a remote study using a set of psychodiagnostic techniques.

The results of a study of a group of subjects using the method of diagnosis of socio-psychological adaptation by Rogers and Diamond (modified by Osnitsky) show that 87% of respondents have a high level of maladaptivity, 84%—a high level of emotional discomfort, and 61%—escapism, i.e., the desire to escape from complex problems of reality.

The Spielberger–Khanin questionnaire revealed a high level of reactive (situational) anxiety in the group of subjects (75%); the majority of respondents had a moderate level of anxiety (86%).

The COVID-19 pandemic put students in a situation of forced adaptation to changing living conditions, as there were restrictions that were not previously imposed by the state. We assume that this fact could have a negative impact on their psychological perception of everything that is happening. The optimal level of anxiety, which allows a young person to stay in good shape, turns into anxiety, causes fear, and leads to panic. It is obvious that right now the problem of maintaining the psychological well-being of the individual is becoming more acute (Silver, 2020).

Using Shostrom Personal Orientation Inventory (POI), modified by Aleshina, Gozman, Zagika, Kroz, the following results were obtained that are important for our study: 74% of respondents have a low level of self-support, 60%—a low value of self-actualization, 82%—an average level of flexibility of behavior, 88%—the need for contact.

Since there is a disadaptation to the new social conditions (forced self-isolation), the need for communication becomes especially relevant for students. As the results of the study show, when this need is not satisfied, young people experience an increase in the level of anxiety, self-doubt (associated with unstable self-esteem), difficulties in personal development, and in general, social and psychological maladaptation develops.

Another aspect of the study that is relevant in the period of distance learning is the implementation of self-support and the manifestation of sustainable behavior, since they include concern for psychological well-being and the ability to regulate one's

emotional state. Based on the results obtained, self-support is weakly expressed in the group of respondents. This means that the participation of this group of students in the psychological support program is important.

Modern research proves the effectiveness of using the approach of "humanitarian goal setting" for the development of the student's personality within the educational environment of the university. At the same time, it is important to use the mechanism of awareness of the essential characteristics of this process and activation of the motivational component through learning self-determination (Khrebina, 2011). These areas of work can be emphasized and considered as priority areas for psychological support in the context of distance education.

The main goals of psychological support for students are: psychological support for the free and harmonious development of the individual in the process of adaptation to the changed social conditions of life during the period of forced self-isolation; prevention of negative trends and correction of deviant behavior of students, overcoming difficulties of personal growth, elimination of conflict situations in relationships with others.

In our opinion, among the tasks of psychological support of students in the period of mass isolation and digitalization of higher education, the following can be distinguished: (1) assistance in the development of the individual's potential (personal, intellectual); (2) the formation of a psychologically favorable environment that promotes the development of creative abilities, flexibility of behavior, motivational orientation, moral component; (3) correction of deviations in personal development, in the behavioral reactions of the individual.

2.4 Conclusions

The problems of personal development and the problems faced by students against the background of the COVID-19 pandemic (maladaptation, emotional discomfort, escapism, high levels of reactive anxiety, etc.) require psychological support for students, which is becoming the direction of the development of modern digital education. Today, during the period of social instability and forced self-isolation, the growing uncertainty of the future and the uncertainty of the present, students find themselves in a new living situation in which manifestations of maladaptation are possible, which means that they need high-quality psychological help and support to prevent negative phenomena.

At the same time, it is necessary to take into account the main task of the field of education (promoting self-determination and self-realization of students), and the special subject–subject interaction between the student and the psychologist, which should also be reflected in the programs of psychological support in the system of modern higher education. Psychological support of students in the educational process is in demand today more than ever. It promotes the formation of a personality, the development of its creative abilities, flexibility of behavior, the formation

of personal and intellectual potential, overcoming deviations in psychological development, which will positively affect the conflictogenicity of the situation and the manifestations of maladaptation.

Thus, based on the above, we can distinguish the following structural organization of the model of psychological support of students during the digitalization of higher education:

- in the course of a jointly organized (with the student) process of psychological support, the difficulties of adaptation to the new digital conditions of interaction within the educational environment that arise in the learning process are determined, the goals of the work are outlined, and ways to overcome the described problems are found;
- the purpose of psychological support of students is the development of the student's personality in the process of socio-psychological adaptation to the conditions of forced social distancing;
- the content of psychological support is assistance in the formation and development of the student's personality in the process of adaptation to the transition to digital education;
- formed results of psychological support of students:

  (1) development of students' personal characteristics;
  (2) adaptation to the new social situation in the conditions of self-isolation and digitalization of education;
  (3) an increased level of self-confidence, positive attitude towards yourself;
  (4) formation of the ability to control your feelings, emotions, behavioral reactions, organize your living space, take responsibility for yourself.

The approbation of the developed model of psychological support of students in the framework of digitalization of education served as the basis for describing the conditions for the effectiveness of this process.

Thus, significant conditions for the assimilation of psychological support of students in the educational environment of the university are:

- high level of interest on the part of the teaching staff, curators, tutors, psychologists in the process;
- the desire of the students themselves to take part in it;
- systematic educational work: dissemination of knowledge about psychological support, psychological methods and forms of work, factors of its implementation, influence on the behavioral and personal characteristics of students;
- creating a favorable psychological climate, an atmosphere of trust and understanding in the described process;
- formation of specific skills and abilities of students that contribute to their adaptation to the conditions of remote interaction.

Thus, the analysis of the data obtained during the study allowed us to conclude that during the COVID-19 pandemic and the transition to distance education, the student's personality was maladapted, frustrated, which required the introduction of

psychological support for the normalization of mental processes. The basis for the deployment of such work can be the developed model of psychological support for students, which we have tested in practice.

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Chapter 3
The Role of Education in Shaping the Ecological Culture of Contemporary Students

Yulia V. Bakulina, Alexander Yu. Nikiforov, Pavel A. Minakov, and Emil R. Burangulov

JEL Codes Q56 · O13 · F18

3.1 Introduction

In the pursuit of economic development, human society did not pay much attention to ecology for a long time. The rapid growth of industry, along with material benefits for humankind, leads to the depletion of bioresources and environmental degradation, which directly affects the quality and duration of human life. The human being is a combination of two essences—biological and social. People exist in nature, create culture, and ensure comfortable conditions for their existence. With the development of the economy, the ecological environment has undergone catastrophic changes. Considerable anthropogenic effects of the ecological crisis must be eliminated as soon as possible. It is no longer possible to count on nature to cope with the consequences of human intervention. To effectively protect nature from the adverse effects of human activity, ecological knowledge is necessary to assess the scale of the aggressive impact on the environment and ensure the harmony of humans and nature. The modern global community has developed the concepts of sustainable environmental development, as well as various legal and regulatory acts dedicated to environmental protection. However, it is necessary to form an ecological consciousness in every person to protect and preserve ecology. Everyone should clearly understand the consequences of the irrational use of natural resources and the consumer attitude toward nature. Environmental education plays an essential and fundamental role in the formation of environmental culture. The paper focuses on the attitudes of the individual since the ecological state of the environment should be as important to a person as social status

Y. V. Bakulina (✉) · A. Yu. Nikiforov · P. A. Minakov · E. R. Burangulov
Ufa State Petroleum Technological University, Ufa, Russia

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and material well-being. The system of values represents the basis for personal social development and indicators of this development, reflecting a person's worldview and system of life views (Kosintseva et al., 2017).

3.2 Methodology

N. A. Berdyaev, a Russian thinker, emphasized the interconnection between the natural features of Russia and the character of Russians: "The soul of the Russian people is wide. The vastness of Russian territory was not conducive to the development of self-discipline and self-activity in the Russian people—they blurred in space" (Berdyaev, 1990).

The philosopher N. F. Fedorov considered universal morality essential in the development of humans and society. Human's dependence on nature and their fear of natural disasters are *evil*. Overcoming these fears should be the primary goal for human development. The destructive use of nature in the interests of civilization without its restoration will accelerate the negative consequences. H. F. Fedorov more than a century ago predicted the "emergence of global environmental problems" that society faced in the twentieth century. He suggested that people use energy resources rationally (Fedorov, 1995).

A significant contribution to the development of ecology was made by the outstanding Russian geochemist V. I. Vernadsky. He developed the theory of biogeochemistry, which formed the basis of the modern doctrine of the biosphere. According to V. I. Vernadsky, human development requires an understanding of the values that should be the basis of our lives, our relationship to nature, and our relationship to society. Harmony with nature requires the formation of human responsibility for consequences, especially concerning nature (Vernadsky, 2013).

Yu. N. Pakhomov, a doctor of sociology who studied the interaction between society and the environment, devoted his works to ecology problems. He introduced the term *ecohuman*: "A new type of person with a developed environmental consciousness, a holistic view of the world, and a high level of environmental responsibility and environmental culture" (Pakhomov, 2002). The formation of this type of person is necessary for the harmonious existence of humankind in nature.

The problem of ecology at the international level was first raised in 1962. The United Nations adopted a resolution on economic development and environmental protection, which states that environmental protection measures should go hand in hand with economic development (UN General Assembly, 1962).

In 1968, the Intergovernmental Conference on the Biosphere in Paris adopted the UNESCO Man and the Biosphere Programme. This program includes a framework for the rational use and conservation of biosphere resources.

At the Stockholm Conference in 1972, the foundations defining the sustainable development of the ecological environment were first discussed. The Stockholm Declaration, establishing 26 principles of ecosystem conservation, was developed. The basis of this declaration was the improvement of the ecological system through

economic development, the responsibility of states for ecosystem damage, and the need to solve environmental problems at the international level.

At the UN Conference on the Environment in 1992 in Rio de Janeiro, UN members decided to adjust their national legislation in accordance with the system of sustainable human development adopted by the world community. The 21st UN Conference on Climate Change held in Paris in 2015 signed an international agreement to regulate "the amount of carbon dioxide in the atmosphere and keep the average temperature of the planet below 2 °C, applicable to all countries" (United Nations, n.d.).

In Russia, the main functions of environmental protection are performed by government agencies represented by the Ministry of Natural Resources and Environment of the Russian Federation and the Federal Service for the Supervision of Natural Resources (Ministry of Natural Resources & Environment of the Russian Federation, n.d.). Environmental legislation and enforcement are a priority for the country. The right of everyone to a favorable environment (Art. 42) and the obligation to preserve nature and treat natural resources with care (Art. 58) are prescribed in the Constitution of the Russian Federation. It is also necessary to note the amendments to the Constitution of the Russian Federation approved by a nationwide vote in July 2020. According to these amendments, the Government of the Russian Federation is obliged to take measures to protect natural resources and reduce the negative impact on the environment. Moreover, the Russian government is obliged to provide "conditions for developing the system of ecological education of citizens and upbringing of ecological culture" (Art. 114).

Federal Law "On environmental protection" (January 1, 2002 No. 7-FZ) regulates the relationship between society and nature arising during the implementation of economic and other activities. The Water Code of the Russian Federation regulates the use and protection of water bodies. The Forest Code of the Russian Federation coordinates the protection and conservation of forests. The Land Code of the Russian Federation regulates the legal basis for protecting land from possible harmful effects of its use. The sources of environmental legislation also include decrees and orders of the President of the Russian Federation and normative acts of ministries, departments, and regional and local authorities (Semenova et al., 2017).

An important role in preserving and protecting the environment is played by environmental non-governmental organizations (NGOs), which draw public attention to environmental problems, promote a solicitous attitude toward nature, and provide environmental education to children and youth. Their activity also includes the search and implementation of ideas and methods of solving various environmental problems.

The Russian Ecological Party "The Greens" stands for constructive, balanced actions aimed at environmental development, taking into account the national interests of the country. The party aims to provide Russia with ecological agricultural products produced in the country, ensure recycling and disposal of waste, develop mass sports and ecotourism, and protect animals, the natural environment, and human health (Russian Ecological Party of the Greens, 2021).

There are about 40 public environmental organizations in Russia. The all-Russian environmental organization "Podorozhnik" is the most progressive among them. The organization aims to provide the rational use of natural resources, conservation of

biological diversity, and public expertise. The members of this organization advocate radical changes in the development of nuclear power, oil refining, and petrochemical industry, as well as the settlement of environmental problems of the country at the level of innovation.

However, a significant number of "greens" pursue their own interests by opposing environmental legislation. One of the oldest and most scandalous environmental organizations is Greenpeace, which has had an official presence in Russia since 1989. The supporters of this organization conduct extreme, often illegal, PR actions (e.g., blocking the *Saturn* platform insured by *Gazprom Neft*). Looking at the list of Greenpeace's main sponsors, one cannot help but think of pursuing political interests. For example, the MacArthur Foundation, one of Greenpeace's main funders, was interested in reducing the circulation of highly enriched uranium in Russia and supported the Bolotnaya Square protests in Moscow in 2012. The foundations that donate to Greenpeace are mostly serious organizations that fund primarily political structures to achieve their nonenvironmental goals.

The resolution of the environmental problem in Russia is a state priority. Since the middle of the twentieth century, the rapid growth of industrial enterprises in the country increased air pollution in large cities to one of the highest in the world. The heavy industrial waste emitted into the atmosphere exceeded the permissible norms dozens of times. The maximum use of natural resources was made to increase production capacity. Smoke billowing from the factories and plants made citizens proud of their country. The government of the USSR did not raise environmental issues, and any protests by the public were considered illegal.

Currently, the solution to environmental problems in Russia is the most urgent. The legal system has developed new ways of rationing in the field of environmental protection, improved the system of state environmental supervision, and developed and adopted the environmental concept outlining the "goals, objectives, and principles of state environmental policy for the long term" (Government of the Russian Federation, 2002).

The year 2017 was declared the "Year of Ecology in Russia" to draw public attention to ecology. Decree of the President of the Russian Federation "On the Environmental Security Strategy of the Russian Federation for the period until 2025" (April 19, 2017 No. 176) recognizes environmental security as one of the main components of national security (Presidential Executive Office, 2017).

In 2017, the "Green Belt" law went into effect, which is very relevant to large cities. In 2017, Russia opened 10 new national parks and nature reserves. Waste transfer stations are being built in Russia to optimize waste processing. The fight against unauthorized landfills continues apace. Environmental activities are carried out to stabilize and improve the ecosystem in certain regions of Siberia and the Urals, where innovative technologies are used. There is an active environmental outreach among schoolchildren and young people.

The formation of environmental values is fundamentally important for the younger generation and society as a whole. Environmental education and culture are the priorities for solving environmental problems.

However, the state of environmental education and culture in Russia remains fairly low and largely does not meet international standards. Scholars from Ufa State Petroleum Technical University (Vanchukhina et al., 2019) formed the prerequisites for transforming the educational program aimed at the development of systemic and analytical thinking of future engineers, including the formation of environmental and social responsibility for managerial and engineering decisions in business.

Currently, the study of students' attitudes toward ecology is a relevant topic.

The authors conducted a questionnaire survey to study the formation of environmental attitudes and value orientations of modern youth.

The research objectives are as follows:

- To conduct a meaningful analysis of environmental values;
- To highlight the most pressing environmental problems in the city of Ufa;
- To create an environmental portrait of students.

The research used the results of a sociological study conducted at Ufa State Petroleum Technological University in 2021. The survey involved 120 students in years 1–4.

The research was conducted on the following environmental values:

- Environmental education and culture;
- Environmental safety.

3.3 Results

A survey of students showed the following:

(1) *Are you interested in environmental issues?*

(a) Yes—55% of respondents;
(b) Rather yes—30%;
(c) Rather no—10%;
(d) Not interested in environmental issues—5%.

(2) *Why do people need ecological knowledge?*

(a) Not to harm the environment—51%;
(b) To take care of health—40%;
(c) To preserve endangered species of flora and fauna—9%.

(3) *What is the foundation of environmental culture?*

(a) Respect for nature—25%;
(b) Improved standard of living—55%;
(c) Concern for the future generation—20%.

(4) *How do you assess the environmental situation in your city?*

(a) Rather unfavorable—55%;

(b) Unfavorable—25%;
(c) Rather favorable—20%.

(5) *How do you learn about the environmental situation in your city?*

(a) Internet—96%;
(b) TV and newspapers—2%;
(c) Environmental movements—2%.

(6) *In what area are the negative tendencies in the natural environment in your city most manifested?*

(a) Air pollution from emissions from refineries—50%;
(b) Pollution by exhaust fumes—45%;
(c) Accumulation of household waste and landfills—5%.

(7) *Who should be responsible for the state of the environment in your city?*

(a) Federal authorities—50%;
(b) Local authorities—45%;
(c) People—5%.

(8) *What measures are currently needed to improve the environmental situation?*

(a) Strict control over the plants' wastewater treatment facilities—50%;
(b) Refusal of cars that do not meet environmental requirements—18%;
(c) Rejection of plastic containers—32%.

(9) *What are you personally willing to do to improve the environmental situation?*

(a) Participate in activities to improve the environmental situation—50%;
(b) Participate in environmental actions—28%;
(c) Give up plastic containers—22%.

(10) *Are you willing to give up the benefits of civilization in favor of ecology?*

(a) No—97%;
(b) Rather no—1%;
(c) Yes—2%.

(11) *Which of the suggested principles of environmental behavior have you not yet been able to follow?*

(a) Waste separation—81%;
(b) Participation in environmental activities—10%;
(c) I manage to follow my principles—9%.

(12) *What prevents you from following these principles?*

(a) Lack of free time—76%;
(b) Unwillingness to change my lifestyle—15%;
(c) I manage to follow my principles—9%.

(13) *What would motivate you to be active in environmental activities?*

(a) Effectiveness of environmental activities—51%;
(b) Possibility of a financial reward—17%;
(c) Additional privileges—32%.

The survey shows that contemporary youth are familiar with environmental issues. The vast majority of young people are interested in environmental issues.

3.4 Conclusion

The study found that young people monitor the environmental situation in their city. The majority of respondents answer that they assess the environmental state as unfavorable, which is undoubtedly a cause for concern. According to most of the answers, the primary responsibility for solving environmental problems lies with the federal government. The students think that strict control of the plants' wastewater treatment plants is necessary to improve the environmental situation. The vast majority of respondents waste separation difficult. Half of those surveyed are not willing to participate in environmental activities. Many students do not see the effectiveness of environmental actions. For example, students collect trash along the road in the forest area in bags, but it continues to lie there for months, which shows the irresponsibility of local authorities.

Among those surveyed, the principal contradiction was revealed. On the one hand, students are interested in environmental issues. On the other hand, they are not ready to take action to protect the environment. Summarizing the results, we can also note that students are dominated by material values, and environmental values are mainly inferior to them.

Contemporary youth do not have the proper level of environmental awareness. The available knowledge is insufficient to meet the level that the environmental situation now demands. Young people are interested in the issue but lack the desire to change the interaction of society and nature for improving the environment. Most doubt the effectiveness of their actions. The young generation does not fully understand the connection between their behavior and the current state of the environment, which indicates the need for correction of environmental education and culture. It is necessary to involve people in environmental activities through spiritual communication with nature and direct interaction with nature.

To implement the goals of environmental education of students, the authors propose the following forms of work:

1. Introduction (teaching) of the academic discipline "Ecology" as an integral part of individual subjects or a block "Environmental Law";
2. Implementation of an interdisciplinary form based on the environmental content of classes in the discipline of TDS (block "Environmental law," "Rights

and obligations of human and citizens"), implying learning and educational potential;
3. When studying the discipline "Fundamentals of Oil and Gas" and "Legal Basis of Subsoil Use," the issues of legal responsibility of individuals and legal entities for violations of environmental regulations should be studied in detail;
4. Extracurricular activities involving thematic scientific seminars on the topics of environmental protection;
5. Scientific activities of students, in which students, regardless of their major, reflect environmental topics in their scientific research;
6. Participation of students in competitions and Olympiads on ecology at the regional and Russian levels;
7. Conducting intellectual games on the topic of tactful attitudes toward the environment.

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Chapter 4
Classification of Factors Affecting the Effectiveness of Innovative Solutions

Irina B. Guseva, Pavel N. Zakharov, Zhanna A. Zakharova, Dmitry N. Lapaev, and Olga N. Lapaeva

JEL Code O32

4.1 Introduction

General trends in the development of the world economy indicate an increasing role of innovation as a factor that ensures the achievement of high rates of economic development. At the same time, attention should be paid to the fact that in addition to generating innovative solutions and developments, it is necessary to ensure their productive implementation in the practice of economic activity. In this regard, each country of the world forms its own national innovation system.

Innovation as an independent branch of scientific and practical activity is a fairly young direction, so we can speak very cautiously about the formation of an integral and complete national innovation system of modern Russia. This fact is explained by a number of external and internal factors, which will be disclosed in this study.

I. B. Guseva · D. N. Lapaev · O. N. Lapaeva
Nizhny Novgorod State Technical University, Nizhny Novgorod, Russia
e-mail: dnlapaev@nmail.ru

P. N. Zakharov (✉)
Vladimir State University, Vladimir, Russia
e-mail: pz@vlsu.ru

Z. A. Zakharova
Vladimir Branch of the Russian Presidential Academy of National Economy and Public Administration, Vladimir, Russia

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4.2 Materials and Methods

The presented research materials, which allowed us to formulate the classification of factors that affect the effectiveness of innovative solutions presented by the authors, are based on the use of both general scientific research methods and special methods (summary and grouping, structuring of the problem field, the method of paired comparisons, and others). The study used open data on the development and implementation of innovative research results by Russian industrial enterprises, as well as expert surveys of specialists of these enterprises.

4.3 Results

Today there are several classification features that affect the economic efficiency of scientific developments. Within the framework of the classification under consideration, all factors should be divided into two main groups: external and internal (Davletshina, 2013). Of absolute interest within the framework of the considered problem is the concretization of the content of this package of factors identified by this paper authors:

I. *External factors affecting the effectiveness of scientific research.*

1. *Insufficiently effective state policy aimed at supporting scientific research and development.*

   The main directions of this policy should include:

   – formation of the institutional environment of the sphere of scientific research and development;
   – implementation of measures to develop the infrastructure of scientific research and development;
   – the mechanism of personnel support of the sphere of scientific research and development;
   – appropriate resource support for research activities;
   – ensuring the balance of economic, social, and environmental consequences of the implemented results of scientific and innovative activities;
   – consistency of support measures at the federal, regional, and local levels of government, etc.

At the same time, the correct choice of priorities of the state's scientific and technical policy describes the volume of implementation of high-tech developments and forms the appropriate technological structure of state-owned companies. Thus, the industry composition of the largest Russian companies includes mainly chemical, oil, gas, energy, and metallurgical companies, which indicates the predominance of the fourth technological mode in the Russian economy (Davletshina, 2013). According to the "Russian Innovation Index" of the Higher School of Economics, the largest share

(approximately 40%) in the structure of innovative and active organizations is occupied by telecommunications enterprises. Also, a significant share in the analyzed structure is occupied by enterprises that produce technological equipment for the aviation and space industry and oil refining (about 30% each). In other industries and types of economic activity, the share of innovative-active enterprises is less than 25%.

Conclusion: The factor of the lack of effective state support is expressed in unsystematic, local interaction with enterprises engaged in the development and implementation of innovative projects, in the absence of effective measures to stimulate investors who invest in high-tech developments (Strekalov, 2015). Moreover, the factor of lack of external financing is found in the lack of financial support from the state, the difficulty of attracting financial resources for innovation activities, the lack of a preferential system of lending to the innovation sector (Pudkova, 2011), the rejection of long-term projects by financial institutions and venture funds (Mindeli, 2013), etc. In this sense, financing is one of the most important barriers to innovation. Thus, it is necessary to optimize the financial model, which provides appropriate resources for each stage of the research and development process. In addition to budget funding, measures are needed to attract private capital to finance research and development.

2. *Insufficient level of development of the institutional environment of the sphere of scientific research and development*

One of the most important components of the institutional environment is the system of regulatory documents regulating the process of generating and implementing the results of innovation activities (Strekalov, 2015). An important role, in this case, is played by the system of tax incentives and preferences for innovative and active enterprises (Abramova, 2007; Davletshina, 2013).

3. *Lack of market orientation of the conducted scientific research*

From the point of view of evaluating the effectiveness of innovation activities, an important aspect is the degree of commercialization of the implemented innovative solutions. Success in the market largely depends on the quality of market research of emerging markets for innovative products/services. However, most Russian enterprises are focused not on the external, but on the domestic market, being mostly not innovators, but imitators, borrowing other people's advanced technologies (Strekalov, 2015). Thus, only 9.4% of Russian companies are engaged in innovation (for comparison: in Germany, this figure is about 70%, in Belgium—60%, in Estonia—55%, and in China—30%) (Mindeli, 2013).

4. *Low level of competence of entrepreneurs engaged in the commercialization of high-tech technologies*

The factor of lack of competence of entrepreneurs is manifested: in the insufficient level of professional literacy, lack of knowledge in the field of the basics of entrepreneurship and the economy as a whole, ignoring the prospects associated with potential threats, the inability to quickly analyze the dynamics of markets, in the lack

of investment literacy of entrepreneurs, the predominant focus on current production tasks without taking into account strategic goals, in the lack of necessary experience with scientific research, etc. (Makarov, 1999).

5. *Insufficient level of involvement of consulting companies in the field of scientific research*

It should be emphasized that small and medium-sized research and production enterprises are often unable to provide sufficient resources for long-term innovative projects, while attracting venture capital investments also has a number of drawbacks: the lack of practice of interaction between counterparties, limited offers in this market segment, high risks, etc. It is clear that the world experience, on the other hand, suggests the importance and significance of consulting services, primarily for small- and medium-sized businesses. Moreover, the range of services of consulting specialists can be very diverse, for example, predictive assessment of an innovation project, individual consultations on the content and specifics of the project, support of the entire innovation process, etc. In general, Russia should note the low level of involvement of consulting companies in the field of scientific research.

II. *Internal factors affecting the effectiveness of scientific research*

In addition to external factors that significantly affect the effectiveness of the research and development process, it is necessary to conduct a study of internal factors, among which the authors include:

1. *Low potential of high-tech enterprises*

The indicator of the low level of potential of high-tech domestic enterprises is manifested: in the predominance of a limited range of products; in the low level of diversification of business processes (Guseva & Dalekin, 2017); in the weak development of the research production base (in the absence of its own services for the development of scientific research (Strekalov, 2015), in insufficient equipment with the necessary scientific equipment, etc.), in the absence of a corporate policy in the field of intellectual property protection, in the immunity of enterprises to innovations, in the absence of effective tools for managing innovative resources, etc. (Makarov, 1999).

2. *Personnel composition of the participants that do not meet the modern requirements of high technologies*

The factor of unsatisfactory personnel composition of Russian high-tech enterprises is expressed: in the shortage of qualified specialists in the field of innovation management and commercialization of scientific and technical developments, in the obsolescence of the competencies of existing scientific personnel (lack of creativity, high motivation, flexibility, fundamental openness to new phenomena, etc.), in the outflow of highly qualified specialists in the field of business and entrepreneurship, as well as their migration to other countries (Verti, 2009).

3. *Poorly developed innovative infrastructure of domestic business*

The insufficient level of the development potential of Russian high-tech enterprises consists in the narrowness of the product line/services provided and the weak diversification of business processes (Guseva & Dalekin, 2017), as well as the lack of research and development services in the organizational structure and the lack of necessary equipment (Strekalov, 2015). In addition, it is necessary to form an internal policy of the enterprise for the protection of intellectual property of the results of scientific and innovative activities (Makarov, 1999).

4. *Low level of business activity*

The quality of management of an innovative and active enterprise depends on many factors, including the level of business activity (Davletshina, 2013). Basically, we are talking about establishing effective communication between the structural divisions of innovative and active enterprises. In addition, the level of business activity depends on the effectiveness of the company's interaction with external contact audiences (suppliers, consumers, competitors, state and local authorities), etc.

This also applies to the system of relations between various participants of scientific projects, including the relations of implementing organizations with the enterprise—the customer of scientific research, the scientific organization, the relations of a particular enterprise and implementing organizations with state authorities and local governments.

These factors can also include the parameters of interaction between management and personnel of an innovative and active organization:

1. from the point of view of the management system of an innovative and active organization:
   - the presence of a reasonable goal-setting of innovation activities;
   - the system used to motivate and stimulate personnel engaged in the field of generating and implementing innovations;
   - training of managers who coordinate innovation activities at the enterprise;
   - working conditions;
   - technical equipment;
   - reduction of occupational diseases and injuries;
   - providing the necessary resources, etc.
   - leadership style;
2. on the part of the employee:
   - understanding of production goals and objectives;
   - internal motivation;
   - highly qualified workers;
   - no fear of error;
   - professional skills;
   - state of health;
   - level of knowledge and experience;
   - reducing the loss of working time, etc.

Moreover, it is known that for each individual innovation project there is a specific set of factors that determine its effectiveness:

- the presence of a clear innovative concept of development;
- favorable macroeconomic situation;
- awareness in the development of this field of scientific research;
- the relationship of enterprises with various sectors of science and institutional structures of the innovation sphere;
- financing of scientific research;
- the existence of extensive basic research before development;
- the amount of research costs and their distribution over time;
- the duration of the period from the moment of completion of the scientific research to the beginning of the implementation of the obtained scientific results;
- the volume of implementation and its distribution over time during the entire life cycle of the innovation;
- the duration of the period of increasing the volume of implementation and the dynamics of the volume of implementation;
- presence of effective coordination of innovative ideas;
- use of advanced technological and organizational solutions;
- taking into account the risks associated with the financing of the project;
- the share of the company's own funds, etc.

Analyzing the possibility of the above mentioned factors, it is possible not only to speed up the implementation time of a particular project, reduce additional financial costs, but also to identify additional market segments in order to systematically and more capaciously develop it (Guseva & Dalekin, 2017).

4.4 Conclusion

Thus, the main goal of conducting a comprehensive assessment of the factors affecting innovation is to increase the effectiveness and scale of modern scientific research.

Among the priority factors of the external environment, the following factors were identified in the article: taking into account the priorities of state industrial policy and legislation; stimulating innovative activity of enterprises; orientation of scientific research to the market; selection of optimal sources and conditions of financing at each stage of the development of an innovative project; use of consulting services, etc.

For successful planning and implementation of innovative projects, it is necessary, in addition to the abovementioned efficiency factors, to take into account the internal factors of the business entities themselves, indicated above in the article: the availability of the potential of high-tech enterprises; emphasis on the quality of corporate governance; creativity and the degree of motivation of personnel; the availability of effective communications and infrastructure of the enterprise, etc.

It should be remembered that the possibility of an objective assessment of all the abovementioned factors provides an opportunity to effectively manage domestic competitive high-tech products not only within the country but also on the world market.

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Chapter 5
Identity of Students with Different Attitudes to Their Health in the Context of Digitalization of Education

Irina A. Kolinichenko, Elena E. Basanova, Svetlana A. Niculina, Maria V. Guzeva, and Olga V. Beregnaya

JEL Codes I2 · I21 · I23

5.1 Introduction

Issues related to adaptation to such a new social phenomenon as digitalization of almost all areas of social life are currently becoming the subject of scientific discussions. Digitalization of education, the subject of which is a person with his own characteristics, reflection of what is happening, interiorization of a direct learning experience, is also the subject of many studies. Psychological science in any sociopolitical condition is always aimed at studying the human personality, its social role, its identity and perception of the world, as well as its assessment of the ongoing social changes.

The identity of a person is a dynamic, developing formation, which in different cultural and historical conditions acquires special features.

The identity of a person is a dynamic, developing formation, which in different cultural and historical conditions acquires special features. However, man is a thinking being and is a subject of activity that independently organizes the space of its own activity. One of the main tasks of the Decree on the development of the national project of modern education until 2024 is the need to maintain the civic identity of Russians on the basis of spiritual and moral universal values. Creating a digital educational environment that meets the parameters of accessibility, quality,

I. A. Kolinichenko (✉) · E. E. Basanova · S. A. Niculina
Pyatigorsk State University, Pyatigorsk, Russia

M. V. Guzeva · O. V. Beregnaya
Stavropol State Pedagogical Institute, Stavropol, Russia
e-mail: olga_beregnaya@bk.ru

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and safety is important for maintaining human life (Official Internet Resources of the President of Russia, 2018).

Despite the difference in theoretical approaches, there is a general idea of the rapidity of social changes, in which the processes of readaptation to the conditions of digitalization come to the fore. It is clear that it would be too ambitious to cover the full range of research on this topic, so we will focus on some of them.

There is a logical explanation for any new phenomenon. The introduction of widespread digitalization of education is explained both by subjective reasons, for example, an increase in human needs for rapid acquisition of knowledge through access to a large amount of information, and by objective reasons related to changes in socioeconomic conditions. Digitalization is perceived as a problem area by scientists, where it is still difficult to determine the boundary between positive and negative effects. But at the same time, it is recognized that digitalization today is one of the most important factors determining the process of interaction between people, in connection with which scientists assess risks and propose strategies to improve security.

Morozov pointed out the change of mental attitudes of students in the conditions of digitalization of education (Morozov, 2020). Verbitsky wrote about the poorly studied possibilities of digital learning, the problems of their widespread introduction into the education system. One of the risk factors is the lack of a psychological and pedagogical theory of digital learning, which would serve as a basis for its design and use, which makes it clear that a significant part of our country's teachers is resisting the digitalization of education (Verbitsky, 2019). Shvaleva and Pishchulina analyze the importance of modern information developments in the development of human creativity, their inexhaustible modifications, and the availability of an array of information (Shvaleva & Pishchulina, 2019).

We are more close to the point of view of Krasnyanskaya and Tylets, who consider the psychological effect of digitalization from the perspective of threats and resource opportunities for human security. They offer a neutral attitude to digitalization as a new phenomenon and express the hope of overcoming the difficulties associated with the development of information technologies (Krasnyanskaya & Tylets, 2020).

We consider the development of technologies to overcome risks and difficulties, as well as the principles of ensuring manageability and proper implementation of the digitalization process to be the main result of scientific research on the problem of digitalization of education.

Within the framework of digitalization, there is the formation of additional virtuality with the involvement of a person in it, which leads not to the expansion of the space of activity, but to the restriction of professional identification. Therefore, in 2018, Dedov described the regulation of professional activity as a problem area, since work takes on a different meaning, characteristic of the virtual space, in which the personality of a professional begins to change and become the neurosystem of the performer of complex professional operations. Dedov recommends the use of adaptive socio-psychological programs as a response to the reality of life in the conditions of digitalization, including humor, creativity, and changing the worldview as a strategy to overcome ambiguity (Dedov, 2018).

Despite the analysis of certain aspects of identity as a phenomenon of development, crises, and connection with the image of the ego of the individual and other processes and phenomena, scientists agree that in general, identity is a dynamic formation, thanks to which a person develops an idea of the image of the ego in accordance with its resources.

In the concept of ego-identity, Erickson considered the development of a dynamic structure of the image of the ego and believed that the social identification or self-identification of a person is transformed under the influence of other people and their changes in life (Erickson, 1996).

Belinskaya, complementing the idea of the problem of the dynamics of identity development, believes that the image of the ego cannot, by definition, maintain stability, since life itself is transitive and changeable. The temporary nature of the image of the ego allows one to choose a social role, and at the same time, avoid role restrictions. Andreeva draws attention to the existence of multiple egos of the individual when understanding identity (Belinskaya, 2015).

The variability of personal identity can be traced in situations of solving moral dilemmas for women teachers who are aware of the need for constant self-education (Kolinichenko & Voronkina, 2018).

Conscious identity helps a person to form a system of beliefs that are consistent with the requirements of society. It is important to purposefully activate the development of students within the framework of educational and professional activities and to form their own identity, provided that the future legal profession is of personal significance (Chibisova, 2016).

5.2 Materials and Method

The study involved about 100 respondents (first-and second-year law students of Pyatigorsk State University in the city of Pyatigorsk, the Stavropol Territory); the groups were equalized by age, stage of training, professional affiliation.

We managed to collect groups of subjects with the opposite attitude to their health: a group of students who consider themselves quite healthy and a group of students who consider themselves unhealthy. The initial hypothesis about differences in the perception of identity among students with different health assessments was confirmed.

The survey and the participant observation were chosen as scientific research methods; factor analysis was used for the calculations as a statistical method of processing the obtained data. The study used the psychodiagnostic methods: "Who am I?" by M. Kuhn and T. McPartland in the modification (Ulybina & Kolotaev, 2016), the authors' questionnaire "Assessment of moral judgments" and the method "Tolerance-intolerance of ambiguity new questionnaire" by Kornilova.

A detailed description of the methods was presented earlier in the article by Kolinichenko, Nikulina, Basanova, Kosenko, Asrieva (Kolinichenko et al., 2018).

5.3 Results

The primary data of the results of the study of identity, ideas about morality, and tolerance of ambiguity were processed using factor analysis. Statistical processing was carried out using the computer program SPSS 8, which allowed us to detect the same number of independent factors in each subgroup of students.

We present the most significant results of factorization of the data of a group of students with a lower-than-average assessment of their health status.

The single-polar Factor 1 "Model of immutability and development of identity with the restriction of moral norms" is the most important and explains 17% of the variance; it is represented by the following categories:

Common, little-modified identity—0.80;

Common identity with the possibility of change—0.75;

Common identity desirable for the test subjects—0.66;

Group identity desirable for the test subjects—0.55.

There are some things that are worth deviating from the norms of morality—0.45:

Group identity—0.45;

Group identity with the possibility of change—0.42.

The content of the factor captures the context of normativity and the development of group identity, which in the future can act as a source of these changes if the group is interested, but at present it is neither an idea nor a locomotive of change. This is due to the fact that its intended (resource) impact is limited to the framework of general categories of identity.

The driving incentive for changes can be the desire of students to belong to a group, which does not fix the rules, but gives the meaning of development through overcoming, changing moral norms, originally intended for performing a dogmatic function, but so far having insignificant weight in the factor and a single inclusion. A fluid identity is assumed to manifest itself, leading to changes in the indicators of social desirability through the evaluation of morality.

Factor 2 is also single-polar, having a 13% contribution to the overall variance, and can be called "Determination of group identity by moral norms", based on the content of the indicators included in it:

Group identity—0.69;

Group identity desirable for the test subjects—0.69.

The behavior of most people around you is determined by the norms of morality—0.69.

Moral norms that regulate the life of society are formed in the course of historical development—0.62.

The basis of morality is the code of criminal and civil laws—0.54.

Group identity with the possibility to change—0.51.

The content of the factor is revealed through group affiliation and the belief that people's behavior depends on moral norms.

High factor loadings have group categories of identity and judgments that affirm the dependence of the behavior of most people on moral norms, the regulation of social life through moral values, and the morality of legal laws.

It is evident that the content of the factor includes "a lot of morality" in the context of the norms of the group, so this is "morality in the group".

The original meaning of moral judgments varies somewhat depending on the overall context of the factor. It was expected that the judgment on the moral side of the laws would have a significant factor load in the minds of law students.

The obtained data can be supplemented by the statement of A. A. Verbitsky; he wrote that the word is not only a carrier of information, which contains the meaning of the term with a definition in dictionaries, but also is polysemantic, its meaning for a person depends on the linguistic context, or, in other words, the linguistic environment of words.

We present the most significant factors identified as a result of statistical data processing of a group of students with above-average health status.

Factor 1, "The model of development and immutability of identity", of the bipolar model, which has a 16% contribution to the overall variance, is combined by categories:

Group identity with the possibility of change—0.76;

Common identity—0.71;

Common identity desired by the test subjects—0.71;

Common identity with the possibility to change—0.65;

Group identity desirable for the test subjects—0.64;

Group identity—0.51.

At the opposite pole:

Personal, categorical variables of identity—0.53.

In the content of the factor, the group categories of identity and the desirability of belonging to the group have high factor loadings. They can be combined and logically opposed only to the personal category of identity.

This can be explained by Tagefel's theory of the opposition between the social and personal identity, in which a person can either be a member of a group (differences are becoming less marked), or show their individual unique features.

Factor 1 of "healthy" students is represented by all categories of common and group identity without "inclusions" of moral judgments; the personal category is oppositional, since it is expected to oppose the common and group identity. The ideas about one's own identity, defined by the parameters of general categories, are also united in the content of the factor, as in "healthy" students, and represent an explicit monolith.

Factor 2 is bipolar, has a 13% contribution to the total variance, and is combined by the following judgments:

The behavior of most people around you is determined by the norms of morality—0.53.

Moral norms that regulate the life of society are formed in the course of historical development—0.63.

Today we need to focus on the moral norms of the past—0.57.

The basis of morality is the code of criminal and civil laws—0.41.

At the opposite pole:

Tolerance of ambiguity—0.60;

Intolerance of ambiguity—0.53.

The content of the factor is contrasted with judgments about morality and tolerance-intolerance of ambiguity.

Factor 2 of "unhealthy" students shows the distribution of moral rules within the group, i.e., it is "in-group morality"; Factor 2 of "healthy" students shows that these respondents evaluate moral rules regardless of the group to which they belong, i.e., it is "out-group morality". The characteristic of the second factors of both groups was that three judgments about morality are repeated and they are located in the same order in both significant factors. These are judgments about the determination of human behavior by moral dogmas, about the historical conditionality of morality as a regulator of human activity, and about moral and civil laws. The only "additional" judgment was a reference to the moral norms of the past years.

Comparative analysis shows the following.

In both samples, according to the first factors, the categories of unidirectional identity are maximally close to each other. All possible general and all group categories of identity are located close to the mathematical load.

Based on the content of the first factors, it is noticeable that the attitude to the state of health does not play a special role: law students consider group membership to be the driving force of change ("the group sets the tone for change and decides everything"). In the minds of "healthy" students, morality is contrasted with the category of intolerance of ambiguity.

The conducted factor analysis showed the formed adaptive strategy in the conditions of existence of a binary society with its reality and virtuality, which is typical for extreme living conditions.

The principle of unity of consciousness and activity determines the direction of a person's mental activity in a real situation; the approach to the strengthening positions in identity with a group seems to be more practical. Categories of common identity are more pronounced than group ones, and personal categories are opposed to all categories of identity.

5.4 Conclusion

Despite Chibisova's conclusion about bringing personal beliefs into harmony with the socioeconomic requirements of society (Chibisova, 2016), but for the legal profession this cannot be justified in the situation of analyzing compliance with the norms of law and morality, a lawyer should not strictly adhere to the framework of established rules, but go beyond it, choose his own path, be a creator. It is possible to influence the understanding of moral norms by law students, taking into account their identity with the preferred group, since the desire for group development, group identity cannot provide any justification for deviating from moral norms.

This follows from the understanding of the difference between "personality" and "subject" in the concept of the subject of activity of Asmolov, which also applies to the activities of representatives of the professional community of lawyers.

The activity of a lawyer is defined through the service of the law and the interests of people and is not limited to the framework of adaptation. The development of personality from the standpoint of humanistic psychology of Rogers is reflected in the understanding of identity with the ideal representative of his profession, the desire to find an example to follow in the process of identification.

Humanistic beliefs can encourage a lawyer not to follow the law formally, without taking into account the interests of the individual, although Kohlberg called this position the morality of justice (Power, 2015), and Gilligan refuted this version of the analysis of the essence of moral judgments, denoting a discriminatory essence on the basis of gender: the morality of men, according to her data, differs from the morality of women, who adhere to care, rather than justice in solving moral dilemmas (Gilligan, 1974).

The phenomena under consideration are subject to further careful study at the meta-individual level. New information technologies encourage people to search for previously nonexistent ways of self-expression. Therefore, today it is especially important direction is to monitor their intended impact on the human psyche, possible changes in personality. It is necessary to use the research resources of psychology to analyze and holistically consider identity and some aspects of digitalization with opportunities to overcome risks.

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Chapter 6
The Thesaurus Concept of Self-determination of Youth in Life: Socioeconomic Aspects

Snezhana V. Yavon, Maria P. Pavlova, and Tatiana N. Ivanova

JEL Codes J6 · J60 · Z1 · Z13

6.1 Introduction

The system approach assumes the presence of important elements?the personality characterized by a multifaceted structure and the environment in three time periods (i.e., present, near future, and distant future). This approach helps to understand human behavior. There is a close relationship between personality and environment that cannot be identified and opposed but depend on each other and condition each other?s existence, activating the essence of each. An intrapersonal development and a person?s behavior are conditioned by internal factors. Personal behavior is influenced by goals, attitudes, motives, needs, values, and other components of the personality structure, which depend on the environment surrounding the individual.

The established contradictions cause the formation of self-determination of the younger generation. On the one hand, these contradictions have a traditional nature of education and socialization affecting personality development. On the other hand, they represent a contemporary set of possible solutions.

In choosing the place and path in life and realizing personal goals, each person is responsible for fulfilling his or her choices. L. N. Kogan wrote, ?The starting point for the creation of one?s own life is choice because it involves finding one?s own ways and means of life creation? (Kogan, 1998). In searching for themselves and their

S. V. Yavon
Volga State University of Service, Tolyatti, Russia

M. P. Pavlova · T. N. Ivanova (✉)
Togliatti State University, Tolyatti, Russia
e-mail: IvanovaT2005@tltsu.ru

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paths, the subjects learn to identify themselves and evaluate their personality, actions, and attitudes toward life. Thus, a person builds a ?self-concept? with its subsequent development and implementation as the main value of the personal system. According to I. M. Ilinskiy, ?The creation of the self is an act preordained by the past. The search for the self is always tied to the present because it is only in the present that we exist? (Ilinskiy, 2011).

Scholars of different disciplines interpret the term self-determination in different ways. The scientific community focused on youth studies indicates that self-determination is shaped by politics, family, personal development, religious attitudes, stereotypes, morality, success, financial and economic status, and more. In this regard, the definition of self-determination in one term implies different content. From a sociological perspective, the Encyclopedia of Sociology identifies the term self-determination from three positions:

1. The subject?s understanding or determination of its own nature or basic properties;
2. The conscious act of identifying and asserting one?s own position in problematic situations;
3. The right of a nation, a people, etc., to determine their own form of government without outside interference (?Self-determination,? n.d.).

The Concise Psychological Dictionary interprets this term very narrowly and specifically??the conscious act of revealing and asserting one?s own position in problem situations? (?Personal self-determination,? n.d.). In general terms, self-determination is ?a person?s search for his place in the world.?

Decomposing the word self-determination, we get the prefix ?self,? which can be found in other words (e.g., self-development, self-affirmation, self-expression, self-observation, self-regulation, etc.). Thus, the prefix ?self? corresponds exclusively to personal activity, proper without anyone?s help on one?s own initiative.

The problem of youth self-determination is at the origins of sociological science. Sociologists A. Comte (Podvoisky, 2002), E. Durkheim (Dubitsky, 2005), Sorokin (1992), and others were more interested in professional self-determination, tending to the empirical nature of the research on this issue rather than theoretical. Cherednichenko and Shubkin (1985) were the first to study and develop the methodology for researching self-determination in life, expectations, and future directions of the younger generation. The developed methodology aims to explore the important points (related to professional choice, employment, and adaptation in a new team) in the lives of young people completing their university education and embarking on a new life path. Since the end of the twentieth century, theoretical research in the field of youth self-determination has become known due to the works of Nemirovsky (1989a, b), Rutkevich and Filippov (1970), Chuprov (1992), Grigoryev et al. (2006), Titma (1992), and others. The formation of the individual as a part of society is elaborated in the studies of Blinov (1975), Sak (1985), and others.

Many Russian scientists have studied life issues and problems of self-determination of the younger generation. The research object included the questions

of goal-setting, life plans, and their realization, and the culture of life with its principles, morality, spirituality, and values. Matulenis (1983), Rutkevich (2002), Titma (1992), Cherednichenko and Shubkin (1985), and others have investigated the entry of young people into society, the consequence of which was the development of the concept of life plans. Studying the issues of self-determination, V. A. Yadov developed the dispositional theory of personality. Korzheva (1976) and Naumova (1988) investigated the individual?s behavior. Lapin (1997) focused his research on the life values of the younger generation. Markov (2010), Simonova (2008), Zakovorotnaya (2010), Trubina (2018), and others studied the issues of socialization and social identity and tried to conceptualize an understanding of self-determination of young people in life. In Western science, clinical sociology, the concept of life trajectories, applied methods of personality behavior research (projective and biographical), and the concept of strategic action is widely known (?Self-determination of youth in life,? n.d.).

It is known that each stage is important in its essence throughout a person?s life. S. L. Rubinstein?s theoretical teachings on the life directions of young people point to the importance of actual attitudes of an individual. The scholar identifies three types of personal life attitudes: attitudes toward the object species, attitudes toward others, and attitudes toward oneself. The internal process characterizes the relationship mentioned above, which indicates the interdependence between personality and life. S. L. Rubinstein believes that a person is responsible for his or her actions and deeds, which are conditioned by the way chosen to deal with problems (Rubinstein, 1973).

Sociologists identify other human attitudes of prevailing importance in society (attitude to religion, attitude to the country, attitude to property, attitude to labor, attitude to family, and attitude to nation).

It is also important to examine the individual?s life strategy. According to the doctrine developed by Abulkhanov-Slavskaya (1991), life strategy implies the ability of a person to independently plan and build his or her life path, overcoming three issues:

- Deciding on the right direction, approach to life, techniques, and periods of goal attainment;
- Resolution of life difficulties related to the desire or its lack to solve them;
- Solving life issues through a creative approach, self-realization of life through a value-based approach.

The researcher focuses on the interaction between the individual and society. For example, it is critical to understand how one gives of his or her strength and abilities and works to receive and consume the necessary reproduced benefits of society. It is also essential to study how socially teachable a person is and how their thoughts converge with society. That is, a person must be able to find his or her place in the system of diverse social relations.

K. A. Abulkhanov-Slavskaya believes that the living environment of the subject depends on the conditions created by society. Therefore, it is crucial to learn how to interact with society by incorporating norms, rights, values, and thinking to navigate

social conditions. A person can determine personality traits and the nature of behavior and form his or her aspirations, requirements, and goals only when he or she is aware of his or her place in life and role in society. Taken together, this makes it possible to realize what role the individual plays in society, how society influences or uses the individual, depriving a person of individuality and personal opportunities, or whether the individual takes full advantage of social benefits (Abulkhanov-Slavskaya, 1991).

According to D. I. Feldstein, the effectiveness and thoroughness of personal self-determination and the formation of consciousness and self-consciousness are especially expressed at a young age. The researcher notes that the consideration of ontogenetic development through the prism of social movement provides a search for new reserves of personal formation and opportunities to optimize the educational influences of various social institutions while highlighting and considering the presence in the development of periods of special openness of the growing person and the internal readiness to accept these periods and ensure self-realization in them (Feldstein, 1995).

D. I. Feldstein believes that self-determination is revealed at the moment of manifesting one?s opinion and position on problematic issues with an initial decision of existential or pragmatic nature. According to the scholar?s theory, the result of self-determination is the focus of the subject in a particular direction in accordance with the active resource and individual abilities, as well as the ability to independently carry out the personal natural and cosmic purpose.

Studying the structure and mechanisms of the independent formation of personality, some scholars indicate that self-determination is a period in the life of each person, which passes independently in relation to some areas of life. Safin and Nikov (1984) argue for the importance of the structure of objective social relations. K. A. Abulkhanov-Slavskaya explores the self-determination of the individual, pointing to the dependence of individual conditioning on society, predetermining their place in society (Abulkhanov-Slavskaya, 1980). Within the subjectivity and objectivity of social reality, we can note that the self-determination of young people is marked with both the continuity of generations (i.e., the acquisition of new social experience) and the creation of a new generation and social experience.

Self-determination in life is formed when an individual has the opportunity and the ability to independently develop moral foundations and principles, relying on them during life. There is a direct correlation between the assertion of self-determination in life and its successful outcome in human life. Nowadays, there is a problem with the successful assertion of self-determination.

Creativity and the possible potential of an individual with certain ideas about the meaning of existence expressed in the subjectivity is directed in a particular vector. Meaningful orientation of humans is aimed not only at the value aspect used in practical activity but also in forming the personal behavior. A certain worldview of the essence of life is built by each person individually when persons determine the subjective knowledge of nature, others, and themselves.

Therefore, the semantic reference point of the life process is some unconscious mechanism of influence on the personality. D. N. Uznadze and his followers developed a structure for this understanding of the meaning of life (Uznadze, 1961). In

his theory, D. Uznadze determined the basic social attitudes of the individual by the term ?set,? as certain prescriptions for personal behavior, as opposed to the term ?attitude? used by Western sociologists and understood simply as social constructs.

Thus, we get a chain of connections?value orientations consist of ?sets? (basic social attitudes), which include socially fixed ?attitudes.?

There are similarities between the concepts of social attitudes developed by Zdravomyslov and Yadov (1965) and Uznadze (1961) in terms of understanding the connection between attitudes and value orientations. Value is the object of value orientations with a sign of social belonging. Therefore, the attitudes of the individual began to be studied as social concepts. Studying social attitudes and values, scholars argue that there are attitudes with attributes of material and spiritual culture of society, which are the basis of value direction. From a scientific point of view, the presence of a life purpose implies meaningful ways to achieve these purposes. The achievement of the goal requires a factor that directs and conditions the motivation and actions of the individual in the social environment. Hence, the obvious social values observed by the individual, which are summarized in value orientations (Surina, 2008).

Turning to the history of sociology, we should note that values were already of interest in the early 1920s. W. Thomas and F. Znaniecki introduced the concept of ?attitude? as a social construct. M. Smith, K. Hovland, G. Allport, and others studied social values and attitudes through the prism of social psychology. The works of R. Merton and P. Lazarsfeld present views on the stability of values and social attitudes and the reasons for influencing their change and formation.

Tolstova (2005), Batygin (1977), Deviatko (2020), Leontiev (1997), and Andreeva (1994) devoted many years to studying social attitudes and values of individuals, groups, and society. L. Thurstone (Pochebut, 2012) developed a mathematical method in the form of standard measurement scales based on the principle of paired comparison of respondents? answers.

6.2 Methodology of Empirical Research

In Russian sociology, there is a discourse about the possibility of using qualitative methods (e.g., observation and in-depth interviews) to study social values and attitudes. The works of Kozlova (1996), Voronkova (1994), Meshcherkina (2002), Semenova (2002), and Malysheva (2002) present theoretical views, approaches, and methodology of studying social orientations.

The essence of life with the possibilities opening for each individual includes learning about life and the formation of value orientations. A young person needs to plan for their life prospects and meet them. With the rapid pace of innovation and society, a young person must make a meaningful choice about his or her life direction. Society challenges young people to make their choices responsibly, despite the obscurity and uncertainty of the immediate future. Certainly, aligned life plans contribute to the prospective development of the person?s future. Moreover, aligned life plans

are the basis for the purposeful motivation of actions formed based on predictive abilities. However, in the current realities of social development, it is impossible to plan for the long term; the question of the need to solve this problem arises. This problem has been raised by many scholars, including Abulkhanov-Slavskaya (1991), Kon (1972), E. P. Avduyevskaya (Sobkin, 1993), Arakantseva (1999), Ginzburg (1994), Dubrovina (2019), Nemov (2020), Markova et al. (1983), Chesnokova (1977), and others.

The following foreign and Russian scholars studying life plans of individuals are well known: Abulkhanov-Slavskaya (1991), Prikhozhan (2007), Lisovsky et al. (2000), Chuprov et al. (2001), Sardzhveladze (1989), Kon (1984), Golovakha and Kronik (1984), Allport (2012) Zimbardo and Leippe (2011), Golovakha (1988), Kovalev (1965), Aseev (1976), Cherednichenko (1985), Zubova (2002), Semenova (2002), Ilinskiy (1999), Ikonnikova (1989), Tolstykh (1984), Mudrik (1991), Maslow (1999), Grekhnev (1985), Cottle (n.d.), Reznik and Reznik (1995), Viliunas (1990), and others.

Thus, theoretical concepts, theoretical views, and empirical research on life plans, social attitudes, and values have formed a certain scientific paradigm. This paradigm is used to study the life perspective and the personal configuration of each person?s future.

6.3 Results

Planning of life prospects includes worldview attitudes about the meaning of life and the value orientation of the individual. These factors together are the basis of self-determination in life. When active, processes of goal-setting directly affect the formation of life plans. Self-determination at a young age is justified by the prospective position of finding life goals, social attitudes, and values, followed by the decision of their successful outcome. Behavioral patterns, technologies, and means of behavior are a mechanism for implementing life plans in certain areas of life.

Nowadays, the time interval of transition from primary to secondary socialization is increasing, which affects the process and intensity of self-determination. Self-determination eventually ends with the self-determination in and the appropriation of social attitudes, norms, and rules (i.e., social subjectivity). Self-determination in life is considered part of social subjectivity.

Due to their age, young people have the potential and opportunities to realize their life plans. Current networks increasingly occupy a privileged place of hierarchy in everyday life. Reasoning about hierarchies and networks, one can vary the development and outcome of self-determination of young people in life.

The thesaurus concept of self-determination of youth in life includes the following provisions:

- Self-determination of young people is a process of purposeful self-organization of personal life through a conscious system of life meanings, values, and goals, as

well as the development of life strategies and tactics. Elements of the structure of self-determination of young people in life are life meanings, value orientations, personal plans, goals (value-sense bases), and behavioral practices;

- The mechanisms of self-determination of young people in life are identification (identity matrices), social construction, and projection of reality;
- The principle of ordering the diversity of value and meaning foundations of self-determination of young people in life and providing orientation trajectories in life activities is the triad ?own?other?s?alien.? This triad corresponds to the allocations ?value?non-value?anti-value,? ?current practices?irrelevant practices?unacceptable practices,? ?immediate social environment?distant social environment?farther social environment?;
- Along with the basic hierarchical structure, the network structure of values and semantic foundations of self-determination of young people in life and their behavioral practices is actualized, corresponding to the traditional and innovative (Yavon, 2012).

Individually, the elements of the complex structure of personality formation include knowledge, comprehension, experience, and skills, which, in fact, are the self-affirmation of young people.

Jacques Lacan developed a model of the three elements (the level of real, the level of imaginary, and the level of symbolic). The developed model explained the psychoanalysis of the personality based on Lacan?s understanding of language. The real includes unconscious content. The imaginary expands knowledge about the environment and, most importantly, about the self. The symbolic creates sociocultural norms and values in the unconscious level of personality. Social representations can be correlated with knowledge, value orientations?with understanding, and the practical activity of mastering the social and material?with skills and ability. The intensity, activity, and distribution between these elements directly affect the formation of self-determination in life.

The basic component of social representations is knowledge gained through the senses. The systemic encoding of time and space contributes to the formation of a symbolic structure that includes codes of emotion, temporal space, corporeality, practical activity, social communication, and values.

The interpretation of social knowledge is paired with the level of social values, indicating an element of understanding. At this stage, the effectiveness of the social experience of individuals in practical activities is important. Semantic variations on social time and space are essential to the understanding of social values in the process of the formation of personality.

The self-determination of individuals and groups depends on how social time is mastered and managed. Every social group is socially dynamic. Each social group evaluates and interprets the past, the present, and the future in its own way. The variation in the direction of each group differs in meaning: some are concerned with generational continuity, others with striving for the new and innovative, while others are content with the present day.

As a system, social space consists of the diversity of the composition of society, which is differentiated by national, ethnic, religious, professional, demographic, age, and other characteristics. The system is supported by political, religious, and cultural norms. The system is marked with inequality in power structures and divergence in the way of life and the rules of conduct. The diversity of social space is due to the variability of patterns of social groups and actors.

The value orientations of the subjects condition the behavioral action, that is, show the skills and abilities. Social representational systems (i.e., knowledge) determine the meaning of societal values.

6.4 Conclusion

The modern information society dictates its conditions to the symbolic element?general meaning is gone, there is a correlation between gender, status, and role; the role of a person as a subject and his or her orientation in the external environment increases.

The main features of the new thinking are as follows (Sak, 1985):

- Not the reproduction of knowledge but the ?production of own knowledge?;
- Opening of new opportunities for self-realization of self-potential (insight);
- Metamorphic cognition?the ability to see the connection between opposite things and a vision of the common and the particular in their interaction;
- Contextual awareness;
- Nonlinear understanding of causality;
- Considering the world as a text;
- Noospheric vision of the mind-biosphere connections.

Thesaurus resources are realized as facts of understanding. The way young people will behave during their self-determination in life will determine social reality.

It is necessary to note that the conditions set by society in the construction of personal life plans contribute to the formation of an independently created personal strategy. The implementation of an independent personal strategy is possible with a dynamic and proactive life activity that focuses on individuality. Active behavior implies new opportunities and perspectives in further acts, which conditions the creation, organization, and rational construction of self-determination in life. The constant innovative implementations force people to constantly work, think, and adapt to the external conditions of existence and the social environment in which people find and develop themselves. The contemporary world is characterized by individuality and the creation of independent planning for each individual?s personal existence.

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Chapter 7
Subcultural Activity as a Phenomenon of Interactive Exchange of a Person and Social Environment

Olesya H. Shereuzheva, Bashir B. Khubiev, and Zarema A. Atabieva

7.1 Introduction

In the beginning, let us note the well-known postulate: the methods and means of social cognition constitute the scientific paradigm of the cognitive process. Let's add—not only. This paradigm becomes a research tool for cognition of social action and human–environmental interaction, and even more broadly, self-organization and reproduction of the sociocultural environment of human existence and activity. It is known that throughout life a person with his system of life coordinates is in a state of interactive exchange with the social environment, nature, and cultural environment. A specific mentality and life system of a person coordinates his multidimensional environment so that "they are in a state of the organic relationship and mutual influence at different stages of the cycle of life" (Dridze, 2000).

The designated segments of the ecoanthropocentric paradigm of cognition of the socially environmental complex of "a living and acting person" put forward a research concept in the study of subcultural activity concerning a special microsocial community, which is a youth with its environment, and it consists in understanding the subculture of youth not only as part of the general culture but especially as a form of interaction between the subjects of formations and their social action. Within the framework of this concept, an attempt has been made to actualize the problem of subcultural activity of youth as a phenomenon correlated with the actions of subjects of the youth environment and focused on external social and environmental factors and relationships.

O. H. Shereuzheva (✉)
Ministry of Labor and Social Protection of Kabardino-Balkarian Republic, Nalchik, Russia

B. B. Khubiev · Z. A. Atabieva
Kabardino-Balkarian State University, Nalchik, Russia

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7.2 Methodology

The socio-philosophical analysis of subcultural activities in the youth environment of the regional society is solved in the article based on both the well-known theoretical provisions of philosophy and sociology. To reveal the personal characteristics, behavioral strategy, and type of activity of the subjects of subcultural formations, the following concepts were used in the work: "sociality of personality" by W. James, "limited physical adaptability of the personality" by Toffler (2002), "social activity" by Weber (1990), Parsons (2000), "activity - activist approach" by Danilova et al. (2019), "communicative dialogue" by Dridze (1993, 1994, 2000), "social and environmental interaction in the youth environment" by Bessarabova et al. (2014), Tikhonov et al. (2017), Finko (2017), Kovalenko (2008). The paper is drawn on the data of a sociological survey of young people using a specially developed questionnaire on the topic: "Problems of youth in Kabardino-Balkaria through the eyes of young people". The survey covered 300 representatives of the youth cohort aged 15–29, including those engaged in studies (50%), work (38%), unemployed (12%), city dwellers (70%), villagers (30%). The presented structure of the respondents as a whole reflects the representativeness of the youth of the studied region.

The problem of ensuring the sustainable existence and development of youth as a social subject directly goes to the field of social development and ensuring the country's security. Kovalenko (2008) believes that security is an indicator of the state of the young generation and society as a whole, it is the ability to adequately respond to real and potential threats and painlessly endure them. For the younger generation, a source of danger, based on the concept of social–environmental interaction, as noted in the work "Sociology of Security", may be "a decrease in the ability of the social system to self-reproduction and self-preservation", as well as the level of "satisfaction and realization of necessary needs and interests", maintaining the ability to self-development (Volkov 2017). Young people make their choice of social behavior and activity under the pressure of the designated objective conditions or because of the influence of the environment and group themselves. The mobility of youth groups objectively complicates their structural composition. This circumstance turns the scientific problems of the activity aspect of youth groups into a difficult segment of the study of the multilayered living environment of their existence. In addition, the evolutionary process of being young objectively proceeds in a situation of continuous feedback with the environment. This factor is not sufficiently taken into account in the available works.

7.3 Results

Studying the problems of subcultural activity, as follows from the concept put forward, priority is given to the interdependence of the person and the social environment. Realizing the vital need for the reproduction of this relationship, as noted

by Dridze (2000), "… people associate in communities, develop norms of the community, create social institutions and organizations that mediate and coordinate their interactions". These provisions also characterize youth-subcultural formations, whose activities are inconceivable without connection with the environment. So, the dominant position in modern social philosophy and sociology is the position of the decisive importance of the organic connection of the living environment and human behavior.

Note that the behavioral strategy of a person, especially a young person, is most often set by the structure and content of personality traits. The American philosopher and psychologist William James distinguish a social personality, a physical personality, a spiritual personality. As a matter of fact, writes W. James, "a person has as much sociality of personalities as individuals recognize a personality in him and have an idea about it". Further judgments of W. James further strengthen the conceptual approach to the essence of subcultural education, which we consider as a result of the interaction of the individual and the social environment. "In practice", he writes, "every person has as many different socialities of personalities as there are different groups of people whose opinion he values" (Stepanov, 2001). Such disharmony, presumably, is inherent in members of the subculture. The generally accepted sociocultural patterns inherent in them act as real adaptation mechanisms that help the subjects of subcultures to solve specific problems of social existence and activity, in the process of which general norms and patterns can pass into individual skills and become the norm of the behavior of members of subcultural formations.

Based on this, we can conclude that the subculture includes subjective human abilities, realized in the activity. In the course of social communication, many subjects are included in the dialogue—carriers of different elements of the sociality of the individual, forming a subcultural group with a sufficient level of social and environmental competence, capable of influencing the socialization of the participants. The emerging communities of peers, diverse informal spontaneous groups contribute to the development of specific youth self-determination and lifestyle, forming subcultural groups. It should be especially noted that the subcultural groups of young people, which are usually created in the sphere of leisure, according to experts, do not always act "as a counterbalance to the dominant system of values and norms in society, since with alternative values it can also include general cultural ones" (Bessarabova et al., 2014). Consequently, the initially realized mutual influence of individual and sociocultural factors on the matrix of interactive exchange of a person and the social environment becomes an objective prerequisite for the formation of subcultural groups. This process is accompanied by contradictions and conflicts, since, again objectively, a person is faced with all sorts of social and environmental cataclysms caused by high rates of social and technological changes, which do not always reflect the needs of social development. In this respect, the conclusions of prominent specialists in the field of theoretical and applied sociology, perhaps not indisputable, are very indicative. One of the fundamental publications says, "Our society sometimes does not even require an obvious growth of the cultural potential of the population, it is not always concerned about its quality. This is the sociocultural dissonance of Russian civilization" (Tikhonov et al., 2017). This state of

affairs inevitably leads to the inhibition of the adaptive capabilities of a person in the socio-spatial environment, which makes significant adjustments to the direction of the activity of subcultural entities.

In particular, the subcultural activity of an asocial nature will gain strength and dominate over prosocial if the rate of social and technological change exceeds the adaptive capacity of a person, which is always limited to change. Predicting the inevitability of social cataclysms in the future, Toffler (2002) in his famous work "Futuroshok" wrote: who is responsible for making decisions". In addition, he emphasized the limitations of a person, as a biosystem, in the ability to adapt to changes in socio-spatial development. Obviously, such a limitation of opportunities and abilities forces a person to look for ways out of the situation using possible methods: uniting in communities of interest, occupation, or in small groups, if the actions concern a youth cohort. To the question "What do you think, what influence do youth subcultures have on modern youth in general?" the overwhelming majority (82%) answered that the subculture demonstrates the ability to "engage in favourite leisure activities", at the same time, there are many who believe that it orients young people to participate in public life (38%), and in general "helps creatively to be realized" (25%). Attention is drawn to the vision of the role of subcultures in the socio-political context. According to 42% of respondents, participants in subcultural formations demonstrate "a desire to stand out, to express their protest against the prevailing foundations and order". In the paradigm of the adaptive abilities of young people, according to our data, priority is given to their own choice, but the influence of social and environmental circumstances is obvious. Direct participation in the subculture, according to the respondents, gives its representatives "temporary hobby" (62%), "self-realization" (38%), "help in overcoming youthful problems" (13%), and "status in the adult world" (7%).

The data presented demonstrate the role and significance of subcultural formations in the self-realization of young people, therefore, in increasing adaptive abilities, which creates objective circumstances for their reproduction. These objective circumstances include the activity segment of youth subcultures, which will be discussed below.

The activities of the subjects of youth subcultures are considered by us as manifestations of their interactive exchange (metabolism) and social environment. Since subcultural activity acts as a social phenomenon, we consider the content of this phenomenon using the methodology of studying the social activity of Weber (1990) and Parsons (2000).

Weber (1990) defines social activity as a certain amount of actions, which "according to the supposed actor or actors, the meaning correlates with the action of other people and is guided by it". This method of explaining the essence of the actions of the subjects of the youth subculture reveals the presence of a mutual (intergroup) social orientation, at the same time reflecting the reaction to the actions of social institutions and organizations. That is, the subcultural activity of young people is also focused on external social factors.

The concept of Parsons (2000) says that in every system of social action there is an interactive exchange, and as a result—the differentiation of the function of the

subjects of action and their distribution according to the status of the social role performed. Attention is drawn to the concept of the "activity-activist approach", the initial premise in it, as noted by (Danilova et al., 2019), says that the focus is on social subjects—agents … or actors, i.e., partners of interactions in various "fields". At the same time, participants in social actions attach decisive importance to the social resources of the subjects. The concept of "social resources" as applied to the subjects of youth subcultures characterizes one or another group with which participants in group formations associate themselves.

The given essential features of "social action", contained in the works of the classics, serve as methodological guidelines in the study of the activities of young people in subcultural formations. The main and pivotal content of social action, as you can see, is an interactive exchange within and in intergroup formations with the interpretation of the content of their subculture and generally accepted culture. These ideas are generally reflected in the current situation in the studied youth environment, which made it possible for almost one-third of the young people surveyed to characterize the subculture as "part of the general culture" (30%). At the same time, in the opinion of 40% of respondents, subculture means "a group of young people with common interests and principles" or "a movement of young people - like-minded people" (11% of respondents).

The activity of youth subcultures expresses a social role, is characterized by its characteristics, is differentiated by orientation either toward the values of the generally accepted culture or towards their subcultures. Therefore, the actions of youth subcultures are accompanied by contradictions that exist in the subjective motivation and behavior of their subjects.

In this regard, the content of the concept of "subjective motivation" is of certain interest. According to Weber (1990) and Parsons (2000), motivation has "a complex of meanings that appear to the subject of an action as a meaningful basis for his attitude or action". Meaningfulness of actions motivates need. "The development of individuality produces a variety of needs" noted in science Tikhonov et al. (2017). As you can see, motivation is a system of the needs of the subject, in our case, the subjects of youth subcultures, and it forms the basis of their actions. At the same time, needs constitute a system of orientation for subjects of different youth subcultures. As mentioned above, these needs have conflicting content. This leads to the conclusion: the subjective motivations that form the basis of youth-subcultural actions are contradictory in relation to the existing social reality.

Note also that the actions of members of youth subcultures in accordance with their subjective motivation a priori defend the system of values and subcultures and the generally accepted culture. Therefore, their actions are at the same time a reaction to the prevailing new social conditions. Since the actions of the subjects of subcultures are accompanied by contradictions in the orientation system of different subcultures, the results can be both negative and positive. According to the survey, joining informal youth organizations is fraught with negative consequences—16% of respondents consider their actions not dangerous and harmless more than 80%. Nevertheless, such a dual state affects the general process of self-realization of members of subcultural formations, demonstrating low needs for subjective motivation (for example,

"lack of understanding in the family") but increased requirements for subjects in the group norms and standards of behavior (in particular, "striving for freedom, expression of protest"). The non-coincidence of the motivation of the subject of the subculture and the requirements for him by the current group norm leads to value differentiation in society. It follows from this: the influence of subcultural activity on the generally accepted culture depends on the contradictions that arise between subjective motivation and the requirements for the behavior of subjects of youth subcultures.

The term "communication" as a technology of interactive exchange of subculture subjects is of particular interest for this study. The communicative dialogue in science is considered a cognitive action. For our topic, it acts as one of the types of activity technologies, serves as a method for studying the content and interactive exchange of subjects of subcultures.

Note that in the course of social communication, a lot of subjects are involved in the dialogue—carriers of different types of subcultures with their statuses and role-playing set. The latter are derivatives of interactive exchange in the process of interaction and dialogue. "In the sociocultural space–time, Dridze (1994) notes, … human interaction with the world around him … means the continuous movement of information flows". This provision, of course, reflects the system of communicative dialogue of subjects in all types of subcultures. But it is fully applicable to the youth subculture because young people are more interested in the dialogue mode for the exchange of ideas, knowledge of the various social features of the personality of the subjects of the dialogue, their inclinations and interests. The dialogue thus becomes a decisive factor in the formation and maintenance of group structures, the detection of the direction of activity of the subjects of subcultures.

At the same time, we note that the content of the communicative dialogue within the framework of subcultural activity is determined by the function performed within the framework of the social role that is realized in various subcultural formations. The functions and corresponding roles of youth subcultures are realized in them based on the general properties inherent in their activities. The direction of activity of the subjects of youth subcultures is determined by the motives for joining them, the orientation system, lifestyle, and forms of communication of their subjects. In the course of the questionnaire survey, it was possible to establish the reasons and motives for the adolescent/youth's entry into informal associations and groupings, which indirectly testify to their orientation and performed functions. The leaders were "loneliness, the desire to stand out from the crowd" (42%), "the desire to change the lifestyle" (18%). The rest of the stated motives, demonstrating the functions of cultures, lifestyle and forms of communication, are as follows: "the desire to find new friends" (10%); "The influence of companies and friends" (42%), "interest in trying something new (clothes, alcohol, drugs)" (15%). Based on these answers, we can conclude that the specificity of the activities of young people in subcultures depends on the motives for joining and the social-role content of their activities. In this situation, as experts note, "the primary task should be the formation of a system of values that meets spiritual and moral needs, which will help develop promising life

positions among the most dynamically developing part of society, young people…" (Finko, 2017).

An important characteristic feature of the subcultural activity of young people is its variability over time, associated with the influence of the constantly increasing flow of communication. This process is fleeting and consists in receiving, perceiving, comprehending, and storing this information, and then transferring it by young people to each other. Thus, information turns into a local tool for interactive communication. In the future, information is transformed into thoughts and feelings, which then become an instrument of social connections and actions. Thus, the information flow is introduced into the "intersubjective circulation", playing the role of interactive exchange of a person and a social environment (Tkhagapsoev et al., 2016).

No matter how the process proceeds, since the subcultural activity is a kind of social role of youth formations, it is ensured by the desire for new conditions of life in society and self-realization, as well as following the value-normative civic positions, etc. To the question "Do you think that the subculture and informal associations help today's youth to show their civic position, to declare their own opinion?" the answers were ambiguous: 41% of the young people surveyed believe: "rather yes than no", and 40%—"more likely no than yes". On the other hand, these data also testify to the endowment of informal youth formations with the desire to adhere to a generally accepted culture, which will objectively accompany the development of established standards of values and norms of generally accepted culture.

At the same time, youth's everyday life is replete with many social and value problems that stimulate the appeal to the values of subcultural formations, including asocial ones. These problems include the modernization of the generally accepted culture, social inequality, the inability to get a job in a profession, or even the lack of work and the conditions of material and spiritual disadvantage associated with them. According to the survey, only 40% believe that they can expect to find a job in their specialty. Among the urgent problems of the region, young people are most worried about the growth of unemployment (60%), low wages (62%), as well as the rise in prices for necessities (48%). Social stratification in the regional society as an alarming problem was identified by 26% of the respondents. These and other factors of life become sources of youth dissatisfaction with the emerging social relations, and as a consequence, as experts note, young people are looking for their ways of self-realization in the environment that is close to them in social and psychological factors, interests, cultural norms (Ilyin, 2009).

It is generally accepted that the preservation, production, and transmission of values from generation to generation is the defining function of culture. The division of society into various social groups enhances their role in the cultural process of transmitting their group values. In view of the internal heterogeneity of these groups, the values of the common culture are perceived in different ways. As for subcultural groups, their perception of cultural values is also facilitated by the "specific microclimate" created in the course of their formation. According to scientists, the emergence and actions of subcultural groups are determined historically, moreover, often for a short time. Therefore, the values of youth-subcultural groups are not necessarily historically transmitted to other generations participating in them.

7.4 Conclusion

Summing up the results of the study, we present a summary conclusion that follows from the analyzed material. Having considered subcultural activity as a phenomenon of youth metabolism and the social environment of its habitat, we conclude that regardless of the orientation of subcultures or the functions of a generally accepted culture, or the functions of youth subcultures, subcultural activity is based on the socio-environmental interaction of the subjects of subcultural formations. The content of such an interactive exchange, realized in the course of their activities, depends on the reasons that determine the emergence of youth organizations of a pro-social or asocial orientation.

The main reasons for the formation and development of youth subcultures in modern society are usually attributed to the social problems of the younger generation, caused by constant changes in the sociocultural conditions of society. The subject of expression of the requirements of the created subcultures is youth formal and informal organizations. "By mastering the environment, making it his own", writes Dridze (1993), "a person brings himself into it, that is, the state and direction of his consciousness, his life credo". Therefore, when creating mechanisms for managerial influence on youth subcultures, it is necessary, first of all, to develop measures that contribute to solving youth problems in integrity, paying special attention to the reasons that cause the formation and spread of youth informal organizations of an asocial orientation.

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Chapter 8
The Digital Phase of the Sociopolitical Development of Society: Basic Characteristics of Digital Media as Information and Communication Technologies of a New Generation

Asiyat K. Botasheva, Svetlana V. Anufrienko, Marina H. Alkhazova, Anna S. Konstantinova, and Larisa B. Ezdekova

JEL Code O330

8.1 Introduction

The founders of the "theory of the information society" made a great contribution to the study of the influence of information technologies on the socioeconomic and political space of the functioning of society. Masuda (1980), who owns the main concept of the information society, methodologically substantiated the essence, and role of information flows. Comprehension of the transition of societies to computerization and the use of the latest technologies and knowledge was, according to the scientist, a powerful driving force behind the overall social and political transformation. In this sense, it is legitimate to talk about the information aspect as an important component of a developed society.

Bell, the creator of the theory of post-industrial society (Bell, 1996), reflects on the informatization of modern society and singles out the key role of knowledge. The scholar assumes that the general social nature of post-industrial society produces a denial of industrial society, and a special type of communication acts as a completely new stage in the organization of social relationships, dictating the course of the historical development of mankind. It's also interesting that Bell saw the information society as classless.

A. K. Botasheva · S. V. Anufrienko (✉) · M. H. Alkhazova · A. S. Konstantinova · L. B. Ezdekova
Pyatigorsk State University, Pyatigorsk, Russia
e-mail: ssidorova@list.ru

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Understanding the flows of postmodernism forced the classic Baudrillard (1981) to pay attention to the symbolic meaning of signs transmitted not only through information contacts but also by the specialized activities of individuals aimed at a special type of communication through advertising, gadgets, and the infrastructure of the city (smart cities). The scholar also describes the uniqueness of information tracking of the organization's attendance, sociopolitical preferences, etc. Another proponent of the postmodern paradigm and the theory of symbolic interactionism, Lyotard (1984), paid attention to the morphology of performativity and marketability (demand for knowledge as a commodity).

Toffler (2017) introduced into the scientific circulation new multidimensional concepts "the third wave of civilization" and "information age", the meanings of which are mainly focused on understanding the information and space ages, global village, and the era of electronics. At the same time, the scientist focuses not on wealth but on the monopoly on information and media, which was rightly considered an important political and economic resource of our time. Subsequently, the assumptions of scientists regarding the universal character of information, based on the analytical and predictive method, were used in the theory of "digitalization of society" and taken as a basis in building the foundation of the study of the modern political and socioeconomic space from the point of view of the influence of new media, which focuses the consumer's attention on the necessary messages and images to them. Thus, Neumann (2018) notes the specifics of communicative relations in the era of digital media and believes that even the service sector can become materialized information; they are based on applied discoveries and are subject to the logic of information processing, as a product of a certain mental activity. Consequently, modern researchers are completely correct in the assumption that information must be viewed from the point of view of capital, a potential source of wealth.

The works of Henry and Lamb (2020), Kruikemeier (2014), Schillemans and Pierre (2019), and others were also useful for this study; they demonstrate that the authors are focused on investigating the problems and risks of using digital media in the interests of politics and economics actors.

The growing phenomenon of digital media, which does not have a stable term yet, arouses unflagging interest in the scientific community. That is why in the works of scientists one can find different models of understanding of such phenomena as new media, social media, digital media, Internet media, online media, cyber-media, mobile media, global media, multimedia, etc.

Thus, modern studies of digital media are interesting for scientific thought. Scientists give conceptual assessments and touch upon in their works a variety of areas of the functioning of new media. Researchers offer a whole range of theoretical and applied innovative ways of using information technologies in the context of the formation of modern reality.

But despite a large number of works on the research topic, it can't be said that the digital media sphere has been studied deeply enough. Thus, there are no basic characteristics of digital media, and there are no research imperatives for the changed nature of media communications after the emergence of digital media.

8.2 Materials and Methods

The purpose of the study is to analyze the activities of digital media in the context of identifying the changed nature of media communications after the emergence of digital media. In this connection, the tasks of the research include:

- Identification of the main and basic characteristics of "digital media";
- Identification of changes in the nature of media communications under the influence of digital media;
- Analysis of the possibilities of new media in the digital phase of the development of society for subjects of digitalization;
- The formulation of the demand for new elements of research by science.

The study of the digital phase of the state of society, the specifics, and basic characteristics of digital media in the era of information and communication technologies of the new generation required the use of conceptual assessments in the course of interpretive, phenomenological, and hermeneutic analysis. Summarizing this kind of approach, it can be considered that the object of research, as a complex phenomenon, is in all respects associated with various aspects of society. The interdisciplinary approach, coupled with the structural and functional analysis of digital media, is universal for identifying the structural differences between old and new media, identifying the main characteristics and features of the functioning of new Internet technologies, which are used in modern media. The internal integrativeness of the theories of the representatives of the Frankfurt school makes it possible to clearly identify the models and factors of the existing connection between the media and society.

8.3 Results

In modern society, the socioeconomic and political spheres can't exist outside the information space. Moreover, there is a tendency toward an increase in the role of new media in not only broadcasting but also in the modeling and construction of information. The use of information resources and technologies blurs the boundaries between the originally biological principle of humans (anthropological space) and the artificial nature of new technologies. At the same time, the change in traditional priorities is so closely intertwined with information technology that the connection between society and the mass media has become integral. At the same time, the growing number of impersonal economic agents focused on benefits becomes an objective characteristic of a digitalized society.

The term "digitalization" means, in direct translation, "digital"—"digit" and the suffix "-ization" implies a "process": "the process of transferring analog data into the digital space", "digitalization process", "digitization", "digital technologies", etc. Today, it is impossible to confine to one definition, because the phenomenon

of "digitalization" is a multifaceted phenomenon that incorporates processes arising from the interdependence of the socioeconomic state of society and the development of information technologies.

So what is digitalization? Trying to answer this question, scholars intuitively find synonymous concepts: "information society" (Masuda, 1980), "post-industrial society" (Bell, 1996), "postmodernism" (Baudrillard, 1981) (Lyotard, 1984), "information age", "third wave civilization" (Toffler, 2017), and others.

The world, in which we live today, is equal to the priority of digital media. These are products and market segments that allow and ensure the integrity of the digital phase of the state of society. But "digitalization" isn't only the introduction of digital devices into the everyday life of society; it's an attitude toward the active involvement of members of society in interaction with digital technologies. Therefore, new generation media play an important role in the development of digitalization. Content from media sources can often be generated by members of the community, popularized by unrestricted content relaying between members, and not censored before publication.

First of all, let's try to understand the meaning of digital media. As the researchers believe, they include online technologies, including social networks (Wolf & Archer, 2012). The distinctive features of digital media from "old" media are also obvious. This is, first, the efficiency caused by the high speed of data on the network. Second, the ability to use open sources and insider information. Third, in digital media, the message is addressed to the user, not the public. It is very important that the user have the opportunity to operate with information in various areas.

Manovich (2011) identifies five basic principles of the nature of new media. This is, first, the mediated style of communication with the discrete presentation of information. It can be said that the content (graphic, sound) is broken down into separate points and pixels. The author draws an analogy with the indirect communication method inherent in computer programming while writing small and self-sufficient modules precedes the creation of large programs.

Second, the resource of digital coding of the material, while the media product becomes the object of algorithmic operations and mathematical functions. For example, the algorithm for creating a photo has different functions: from changing the color or contrast to completely changing all the outlines.

The third principle becomes possible if the first two are summed up. As a result, it turns out that a media product from scratch can be made, relying on automation, using ready-made templates, and algorithms (which should free the worker at the machine from many routine operations).

Fourth, mutability is the principle of digital media. A new media object—for example, a website—isn't something fundamentally created for centuries, but it can serve a person in different (potentially endless) versions. Traditionally, a human creator functioned in the old media. He established visual contact or manually eliminated interference, collected text, visual, and audio elements. On the contrary, in digital media information can be stored in digital form for a long time; media elements have a separate identity and can be controlled by the program (Manovich, 2013).

So, digital media is a single production and communication process that provides forms of information perception. For example, after the invention of iPod, podcasting became popular among users, providing distribution, receipt, and assimilation of information downloaded from the Internet. In the future, consumers will have another innovation—"cross-media", meaning retransmission of the message in a free and instant form, and the ability to simultaneously use different media.

In the conditions of a developed information society, which has brought breakthrough information technologies into the world of media, it is of fundamental importance to divide the media into traditional and electronic, or old and new. Therefore, convergence processes stimulate the transformation of the old into the so-called digital media. It's postulated that technological progress has an impact on the communicator and the recipient, because the process of collecting, establishing mutual contacts, etc.—forcing all types of media to make adjustments to the structure of their activities.

Hypothetically, the products of using digital media can be very diverse: e-commerce; games: online and mobile; websites and mobile applications; animation; social media; videos of different aspects; augmented reality; data collection, data analytics, and virtual reality; data visualization; various location-based services, on-demand computing; interactive storytelling; online databases, etc.

All of them have several key features that have led to general social characteristics of a qualitative change in their functions. We are talking about accessibility, high mobility, and lack of direct communication, which makes it possible to anonymously provide false information, the ability to experiment with forms of perception, influence the consciousness of an unlimited audience, experiment with the capabilities of the media, and construct "quasi-communication" and virtual reality.

Digital media can be applied in such areas as entertainment; various kinds of technologies; e-commerce, bidding, and sales; noncommercial content; health services; services in the area of education; marketing and advertising; while information is provided online by the government; government services; sport; environment; interactive television; publishing services, etc.

As Orihuela rightly believes (Orihuela, 2008) that new improved technologies introduce an imbalance in the activities of traditional media, which need to adapt and retrain with new communication formats, master new grammar, and a new style of communication with the consumer now.

Today, a passive viewer has already become a rare consumer, and an active user, who is interested in gamification, has his preferences while searching for informational content, and often independently produces social communication. And, which is also important, this process takes place in all strata of society. Thus, the process of communication isn't a frequent case; therefore, it doesn't end up with the consumer. From this moment, the consumer has the opportunity at the pre-communicative stage to choose, purposefully seek, and independently decide on the content of information. Each subject can write, speak, and shoot. Consequently, new categories of recipients are emerging, they have the opportunity to participate in all phases of information creation, and even create their media.

The modern agenda, which may be political and socioeconomic, can no longer be formed without the use of information technologies. Digital media makes extensive use of visualization, 3D graphics, graphic design, interactive maps, tags, podcasts, etc. The Internet is equally important for industrial, social, and economic development. These are all kinds of blogs and websites, as well as news programs in an interactive form, which implies feedback.

As a result, media brands that produce a certain kind of content, for example, information coverage of environmental problems, the life of nature, political events, novelties in the area of robotics, etc., or working in the area of journalism, can achieve such results when information exchange is successfully implemented.

Finally, the media format is changing dramatically, giving way to electronic formats: Netflix, Facebook, or Instagram. It's not surprising that in the digital phase of the development of society, successful economists predict: "digital changes will be large and it's necessary to invest in technology" (Rosell et al., 2016).

On the other hand, the theory of Lippmann (2016) doesn't lose its relevance in the digital phase of the development of society; he formulated the idea of a "pseudo-environment" formed by the same digital media when a person is not able to verify the reliability of information and is forced to trust it.

Digital media can create an artificial, false picture of the world in the mind of an individual; due to this, the picture isn't a reflection of the reality taking place in the world, but a formal construct, which successfully masks reality. It should be also noted that the nature of manipulation involves a double effect. The first concludes in the open phase of broadcasting information, the second is in a parallel "encoded" signal designed to cause those actions, behavior, opinions, or feelings that are needed by the manipulator. Of course, the maximum success of marketing, political, or other manipulation is facilitated by the incompetence of the individual or groups in a particular issue, which allows the manipulator to successfully penetrate consciousness.

An important factor is also the traditionally high level of public confidence in Internet forums when there is an illusion of objectivity and independence of statements. Young audience is especially receptive; it is initially inclined to trust the statements of peers, whose communication is replete with specific vocabulary, accompanied by a youth style of dialogue and conducted in a certain manner. Therefore, it's quite natural that blogging platforms that allow keeping diaries, which make it possible to express ideas and thoughts almost anonymously, are very popular platforms among young people.

Manipulation to shape a specific customer response or agenda has become ubiquitous. In this case, the objective reflection of facts is pushed into the background, and the tasks of managing mass perception with the help of fictional events, facts, and processes come to the fore. Moreover, modern Internet technologies make it possible to use computer graphics to create fake news, where it is impossible to distinguish truth from lies without careful specialized expertise.

8.4 Conclusion

Moving on to the conclusions, the authors can safely state that the classic type of public communication, which signified newspaper circulation, radio, and television signals, is outdated. Previously, the recipient was passive, and the public texts were based on the work of a reporter who rushed headlong to the editorial office to the typewriter until other eyewitnesses of the event were ahead. Now the usual production "workshop" of information has become new digital technologies, multimedia editions, which provide ideal matrices of multivariate symbolization mechanisms. Thus, the interactivity and hypertext link that appeared at the end of the twentieth—beginning of the twenty-first centuries gave certain advantages to "new media", and the ability to transform the information area.

Let us build the following chain of transformation of media communications under the influence of digital media, because some points arise from this moment:

- the user actively declares himself as a full participant in the communication process;
- the content of information has begun to express the individuality of the author and the media as a whole;
- multimedia has become a form of a universal language of communication available to most;
- digital media brought the understanding that "here and now" is the key to a user, who values his time and invests it;
- hypertext has become a new alphabet and grammar.

So, we have studied the main characteristics of digital media, as a set of various information flows invented by mankind in the course of technical, cultural, and historical development. First of all, it's the predominant visual character of digital media, which refers to television, advertising, films, and books. The authors also include all electronic means, which are based on digital codes: the Internet, computer games, pocket PCs, smartphones, e-books, and dialogue television. Secondly, it's the ability to leave comments in an interactive format. Providing a similar variation are tablets, mobile phones, and computers, where web blogs are created, which can additionally be used to communicate with other blogs, websites, and different media similar in a combination of text, image, and interests.

As a result, subjects of digitalization have the opportunity to do the following:

(1) use various information resources and media capabilities as a tool for building the desired content;
(2) organize connections between individuals for the cooperation of large masses, where the ease and simplicity of the organization can make the potential audience limitless.

It is important to note the increased possibilities of using various online resources as a tool for creating not only local networks but also their content. As a result, new norms and institutions of information interactions can be used as an effective way

of communication between individuals, for cooperation and socialization of large masses, because the ease of use of social networks makes the potential audience limitless. There also appeared the opportunity to generate and change the content of information in any direction: in the area of advertising; in the area of industry and business; in the area of medicine and education; in the area of forming a perspective of a negative or positive political image, etc., depending on the aim of the original message.

It is expedient to focus separately on the relevance of new elements of research in the area of science. So, virtual social networks began to act as an addition and expansion of the individual's behavioral practices. From this moment, they can dictate fashion, behavior, political, and other preferences of a modern person, up to interference with its physical and mental state. This fact is usually interpreted as a psychological influence, but it was said about the possibilities of a more cardinal influence on the consciousness of an individual, who is becoming—every year—increasingly dependent on virtual space and virtual images. The authors also assume the relevance of a further scientific understanding of such elements of the novelty of their research as the impact on the sociopolitical behavior of a person and his psychological state of two parallels—online and offline life, which is associated, first, with the leveling of morality and manifestations of a deviant behavior in virtual communication and, second, with the ability of subjects of digitalization to develop and implant the necessary identities in society.

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Chapter 9
Communicative Aggression in Online Education

Oxana V. Goncharova and Svetlana A. Khaleeva

JEL Codes A200 · A210

9.1 Introduction

The COVID-19 pandemic has forced many countries to adapt to new situations in various sectors, including education. The success of communication in the distance format is the most important guarantee of success in training. However, the lack of personal contact with the teacher can lead to many barriers in the distance learning process (Galusha, 1997; Kranich, 2003). Difficulties impeding effective communication can be caused by technical failures. However, along with access problems and technical difficulties, there are perception problems, as students often report feelings of confusion, anxiety, or frustration and want to get faster feedback from the teacher regarding the course content (Freedman et al., 2003; Isman et al., 2003; Sedov, 2005). Difficulties in communicating in online classes may arise due to a lack of a sense of emotional connection with each other or a lack of real-time feedback in traditional learning (Kim et al., 2005). The literature on distance education emphasizes that there is currently a "degradation" of interaction between students and teachers, on the one hand, and in student groups, on the other. In addition, the issue of aggressive behavior is raised, which can become a significant problem as online interaction becomes more common (Galusha, 1997; Nakamura, 2012). As noted by a number of researchers (Hinduja & Patchin, 2011), online interaction, email, text messages, chats, blogs, etc., contribute to the spread of aggressive and offensive comments about fellow students, teachers, and other people. Aggression in online contexts has received an extensive research response over the past decade, and most of the works in this area are devoted

O. V. Goncharova (✉) · S. A. Khaleeva
Pyatigorsk State University, Pyatigorsk, Russia
e-mail: goncharovaov@pgu.ru

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to the study of verbal and nonverbal characteristics of online aggression in extremist forums (Fernandez et al., 2018; Sharma & Maleyeff, 2003), including information from users' self-presentation in social network profiles (Berger & Morgan, 2015), hashtags used (Like & Afif, 2020), cyber-aggression in online games (Gray, 2012; Magdy et al., 2016), etc. However, there is a need to expand the scope of online content analysis, and in this study, we aim to fill the theoretical and methodological gaps in the research of online aggression in the course of distance learning.

9.2 Materials and Methods

Samples of text and video data were collected from a total of 162 online recordings of classes and exams conducted in the form of distance learning, stored in the cloud service ZOOM, access to which was provided by the teachers who conducted the classes. The video recordings of the classes were preprocessed and translated into text format and then used to create the corpus for the study. The text of online chats written by users in each of the classes was cleaned up by removing the HTML/XML content left over from archiving, which is a necessary technical step before working with web text to ensure that only the actual data written by users is used for analysis.

The complexity of the analysis of the text corpus is explained by the specifics of the material being studied. And if earlier in the analysis of cyber-aggression in online chats or games, direct threats or insults were studied (Magdy et al., 2016), then in our study such explicit units of manifestation of this emotional state were not considered, since aggression was expressed implicitly.

Thus, after the text records were divided into groups ("students" and "teachers"), it was decided to select the following elements from the corpus texts as units for further analysis: abbreviations, slang, graphic items, and questions. Further, by means of a continuous sample, the analysis of the studied corpus was carried out to identify the syntactic, lexical, and morphological means of expressing aggression. The final text material formed in this way was supplemented with a description of the visual effects of communication in order to identify nonverbal manifestations of aggression.

9.3 Results

Considering the phenomenon of online communicative aggression as "purposeful, motivated, conflictogenic speech behavior, which is based on an emotional negative impact on the addressee" (Ushakova, 2018), we set ourselves the goal of identifying specific communicative and pragmatic means of verbal and nonverbal levels that allow the addressee to achieve their main pragmatic goal of destabilizing the communication process in general and the addressee, in particular, through aggressive speech behavior.

In the course of the analysis of the texts, we identified the following means of aggression:

1. Syntactic means of expressing aggression.

It is well known that one of the indirect rhetorical uses of questions is the expression of implicit aggression (Apresyan, 2003; Yakovleva, 2017). When analyzing video recordings and online chats, we identified some uses of rhetorical questions that have an aggressive implication:

– evaluative rhetorical question:

S (Student): Am I stupid? I'm telling you that I uploaded it yesterday (online recording of the lesson).

– a question challenging the teacher's competence:

S: Are you sure you know how to use it (anti-plagiarism)? (online recording of the lesson).

S: Maybe it was you who couldn't open it? (online recording of the lesson).

It should be noted that challenging the teacher's competence in online learning is a serious problem. For example, in a study on cyber-bullying of teachers, it is noted that 15% of complaints were related to attacks on the personal qualifications of the teacher (Clark et al., 2012a, b).

Rhetorical questions, following one after another, form a syntactic parallelism (Vorontsova, 2016), expressing aggression:

T (teacher): Don't you understand the question? Why don't you tell me about Maslow's theory? Why don't you just explain its meaning? (online exam record).

2. Lexical means of expressing aggression.

The analysis of the material under study showed that the most common means of expressing aggression were implicit negations. For example, verbs expressing a personal belief or opinion usually involve the postulation of an aggressive implicit negation (Dahl, 1979; Hamilton, 2012):

S: You think you're so smart, don't you? (to another student who gave an answer earlier - online chat during the class).

Another way to express aggression in online communication are verbs in hyperbolized meaning, which, according to some researchers, can indicate in the main meaning a quantitative assessment and suggest that the action they indicate requires a lot of physical effort (Glovinskaya, 2004). For example:

C: This test is stuffed with all sorts of tasks (online chat during the lesson).

Another lexical tool for displaying communicative aggression in the course of online learning is the use of inappropriate abbreviations in the chat, such as "wtf":

S: Wtf, but I forgot to forward it (online chat during the class).

Aggression aimed not at a negative impact on the addressee (Soni & Singh, 2018), but at assessing the situation when it does not match expectations, is represented in the studied material by phraseological units:

P: Blood from the ears (online recording of the lesson).

P: You are silent, like you've lost your tongue (online recording of the lesson).

3. Morphological means of expressing aggression.

When analyzing recordings and chats of online classes, the only identified means of transmitting aggression were diminutives, i.e., "words with suffixes of subjective evaluation" (Buryakovskaya, 2010). Obviously, if we consider words with diminutive suffixes out of context, they are a "form of positive characteristic" (Buryakovskaya, 2010). However, the meaning of these units has expanded and in a certain context, they can change the meaning of an utterance, giving it a shade of aggressiveness and disdain, for example:

T: Please enable screen demonstration when answering.

S: You have excellent tricks (in Russian: *приемчики*) (online record of the exam).

It should be borne in mind that such morphological means as diminutive suffixes are not typical for all languages.

4. Stylistic ways of displaying aggression.

Negative comparison, irony (Perreault et al., 2002):

T: … clearly not Shakespeare (online recording of the lesson).

5. Nonverbal paralinguistic ways of displaying aggression.

Aggressive speech is also characterized by "kinetic intensity", various nonverbal manipulations "make the speaker visible, increase his image" (Komalova, 2015; Perreault et al., 2002).

In this study, when viewing the provided ZOOM recordings of classes, we noted active gesticulation and throwing out objects that are clearly associated with aggression, but at the same time accompanied by the choice of neutral language and speech means:

T: Do you disagree with the mark?

S: I agree (he waves his hand and throws a pen). (online recording of the lesson).

In addition to active nonverbal means, it is impossible not to mention the so-called "tactic of threatening silence" (Sedov, 2005) on the part of the teacher in response to provocative actions of students (imitation of a network failure, inability to enter the class due to technical problems, etc.).

6. Nonverbal graphic means of expressing aggression.

The insertion of emoticons creates a new digital nonverbal landscape that can even enhance communicative content. Laughing emoticons are not supposed to show any negative intent in their original nonverbal meaning, but the combination of several similar graphic images of a smiling human face could be associated with irony and sarcasm. In the example below, a repeated smile can convey a strong desire to insult a person:

S: You can turn on the sound yourself, you're IN CHARGE here—smile, smile, smile (online chat during the lesson).

In this example, another indicator of the student's irony and sarcasm toward the teacher is the use of capital letters in the phrase "to be in charge".

Ellipsis also appears as a means of aggression (Fortunatus et al., 2020; Komalova, 2015):

S: And the teacher is always right … (online chat during the lesson).

Polemic brackets as a means of saving lexical resources help to achieve the maximum concentration in the expression of negative emotions:

S: Did she give the best (?!) answer? (online chat during the class).

Another means of expressing aggression identified in the course of the study was the intensification of punctuation marks, which carries an aggressive connotation (Fortunatus et al., 2020; Smith et al., 2020):

C: My Internet was just down!!!!!!!!!!!!!!!!!! (online chat during the class).

9.4 Conclusion

Based on the studied facts, it seems possible to assert that communication in the framework of distance learning has various specific features, which also include the manifestation of online aggression. The latter is characterized by the presence of special tools, consisting of verbal and nonverbal means, actively used by both teachers and students for the purpose of emotionally negative impact and destabilization of the communication process during online lessons.

Among them are syntactic means (indirect rhetorical and evaluative questions with aggressive implication), lexical means (the use of verbs expressing a personal belief or opinion, verbs indicating quantitative evaluation in a hyperbolized meaning, inappropriate abbreviations), morphological means (the use of diminutives), stylistic techniques (negative comparison, irony), nonverbal paralinguistic methods of kinetic intensity, tactics of threatening silence, and nonverbal graphic means (font size, emoticons, punctuation marks).

In general, communication in the framework of online learning differs from other forms of virtual communication in that it is a combination of oral and written communication between a teacher and a student, which is carried out synchronously and cannot be interrupted voluntarily, since it is regulated by the "compulsory" format established by the educational institution. Thus, if there is no choice: to enter or not to enter into communication, the probability of aggression against the background of spontaneous manifestations of negative emotions, both on the part of the addressee and on the part of the addressee, is quite high. Nevertheless, it is necessary to emphasize the conditionality of such communicative conflicts, since, unlike real ones, they usually have neither a logical conclusion nor communicative consequences. The teacher most often uses his administrative resource and interrupts an aggressive dialogue or switches to other students of the online class.

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Chapter 10
Identification of the Aspects of Educational Deprivation of Students and Teachers of Higher Education Institutions in the Conditions of Distance Learning

Elena F. Torikova, Aleksandr V. Torikov, Natalia V. Lazareva, Liliy V. Semenova, and Victor A. Fursov

JEL Codes A10 · A22

10.1 Introduction

In the current unstable socioeconomic conditions, tendencies of deprivation of personality in various aspects of life are increasing. Deprivation is a restriction of opportunities to meet certain needs caused by the loss of connection with the object of meeting those needs (Yaroslavtseva, 2014).

The problems of deprivation are disclosed in the works of Russian and foreign researchers. Experts identify the following types of deprivation:

- Emotional deprivation is caused by the lack and disturbance of emotional relationships in the family, especially under the conditions of a distorted functioning of the psychological and biological "mother–child" system or a departure or loss of a significant family member;
- Social deprivation manifests itself in a deficit of communication and difficulties in establishing contact. It is often typical for the orphans, residents of children's homes, homeless children, and children in troubled families;
- Sensory deprivation manifests itself in the insufficiency of external influences caused by blindness, deafness, or hypokinesia;
- Motor deprivation is a lack and significant limitation of motor activity;

E. F. Torikova
Stavropol State Pedagogical Institute, Stavropol, Russia

A. V. Torikov · N. V. Lazareva (✉) · L. V. Semenova · V. A. Fursov
Don State Technical University, Rostov-on-Don, Russia

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- Cognitive deprivation lies in a deficit of structured and comprehensible information;
- Maternal deprivation is a lack of maternal love, care, and socialization apart from the mother.

Deprivation conditions of life and activity are extreme for humans because these conditions violate the most important mechanism of existence, adaptation, and ontogenesis—the emergence, complication, and satisfaction of basic needs. Under conditions of insufficient educational and social influence, the mechanism of regular mental development, which determines its correctness and consistency, is violated (Yaroslavtseva, 2014).

The needs of social functioning—the inclusion in the system of relations with the social environment, of which human is a part—are fundamental. The individual, acting as an object and subject of socialization in society, assimilates social norms and values from an early age and influences the surrounding life by participating in educational, professional, and other types of activity. The satisfaction of social needs for social belonging and competence has a positive effect on the formation of the person's character and provides psychological health, confidence, independence, and autonomy. Failure to meet these needs leads to dependence on others, increases anxiety, and causes mental stress and other negative conditions contributing to the social disadaptation of the individual.

The generalization of certain processes currently occurring in society reveals new types of deprivation.

The digitalization of society creates the conditions for the emergence and interaction of two trends: the emergence of new technological opportunities and the restriction (deprivation) of manifestations of personality in traditional activities, communication, and cooperation.

The inability to use a wide range of information technology and electronic services (for whatever reason) is also considered a type of deprivation (digital deprivation).

O. N. Vershinskaya defines digital deprivation as a situation when the way of life common for the majority is impossible for a particular individual due to the lack of skills to use ICTs or the desire and ability to acquire these skills (Vershinskaya, 2016, p. 432). When certain possibility has not become a condition of realization and satisfaction of the needs important for the person, there is no deprivation as such. Nevertheless, as soon as this opportunity becomes the social norm or the only possible way to solve certain problems, the person who does not use this opportunity becomes deprived (Vershinskaya, 2016). This applies to social and digital inequality. As more and more aspects of social life are realized through ICTs, and electronic services become a routine part of everyday life, those who do not use them will have more and more inconveniences. O. N. Vershinskaya discusses basic digital capabilities and needs and lists basic digital deprivations. These lists are determined by public surveys and expert evaluations. Thus, there is a periodic change in these basic digital capabilities and, consequently, in digital deprivation.

Naomi S. Baron notes that any technology is ambivalent. On the one hand, electronic communication allows people to stay in touch with a considerable number

of people. On the other hand, it forces the establishment of superficial and formal contacts, reduces the process of communication, and causes the loss of personal content and individuality of interaction.

The use of e-learning and distance learning technologies is highly possible to cause the deterioration of interpersonal communication in the educational process. It seems that digital learning resources and electronic communication tools are designed to solve the problem of organizing the learning process (Torikova et al., 2020), for example, in a pandemic. However, they complicate the organization of full-fledged educational cooperation, which provides students with a search for new ways of action and interaction (Zimnaya, 2006) and ensures the formation of reflection and the development of self-control, self-assessment, cognitive activity, and creative independence.

There are several criteria used to define a learning collaboration. As a joint activity of the organizational system of activity of interacting subjects, cooperation is characterized by the following attributes:

- Spatial and temporal co-presence;
- Target unity;
- Organization and management of activities;
- Functional, efficient, and operational separation;
- Positive interpersonal relationships (Zimnaya, 2006, p. 283).

Studying the development of student–teacher cooperation as the foundation for the formation of individual learning activity, V. P. Panyushkin singled out the following dynamics of forms of learning cooperation:

- Phase 1—induction into the activity:

  (1) Actions are shared between the teacher and students;
  (2) Simulated actions of students;
  (3) Imitative actions of students;

- Phase 2—coordination of teacher and student activities:

  (1) Self-regulated actions of students;
  (2) Self-organized actions of students;
  (3) self-initiated actions of students (Panyushkin, 1979, p. 18).

The listed conditions for implementing educational cooperation are difficult to reproduce in a distance learning environment. In this regard, we can talk about limiting the potential of the educational process and the inability to use its laws for learning and personal development fully. That is, in this case, we are talking about educational deprivation. In the conditions of distance learning, it is challenging to form some competencies (e.g., "Learning competence 3. Students can carry out social interaction and realize their role in the team" in the preparation of bachelors).

10.2 Materials and Methods

According to L. N. Berezhnova, "Deprivation in the educational process is a phenomenon that occurs in the life of learners, when they are limited or deprived of the opportunity to meet the leading needs for a long time, which significantly affects their education" (Berezhnova, 2000, p. 21).

Educational deprivation can be caused by factors external to the educational process (e.g., the forced need to switch to a distance learning format) and by the peculiarities of the educational process itself, which is not excluded in the traditional organization of training in the offline format.

Educational deprivation occurs in the following conditions:

- Violation of intersubjective exchange of activities in the educational process;
- Alienation of the subjects of the educational process from the educational activities;
- Disparity in the links of the educational process;
- Restrictions on opportunities for self-development and self-realization of students in the educational process, including an individual character.

The empirical research of the attitudes of students and teachers of a pedagogical university to training in the conditions of distance learning aimed to identify the deprivation aspects of distance format of professional training.

The authors conducted an anonymous questionnaire survey of the subjects of educational relations of the pedagogical university to obtain empirical data.

Within the framework of the system for managing the quality of education in the university, the authors developed questionnaires for teachers and students, implemented an anonymous survey, processed and recorded the results, and developed conclusions and recommendations.

The questionnaire for students contained several items. The respondents were asked the following:

- Indicate general information about themselves (under the condition of anonymity): faculty, the direction of training, course, and form of study;
- Evaluate several parameters in qualitative terms from "bad" to "excellent." These parameters are as follows:
  - Level of adaptation to distance learning;
  - Level of information about changes in the educational process implemented in distance form;
  - Degree of convenience and satisfaction with the classes held in a distance format, the convenience of using the electronic educational environment of the university;
  - Work of scientific and pedagogical employees in these conditions.
- Analyze possible changes in the psychological and physiological load on students and the level of motivation for learning caused by the transition to distance learning;

- List the used distance learning tools, sources of electronic assignments, and electronic resources used to provide feedback to teachers (including sending completed assignments for review);
- List technical problems and personal difficulties, claims on technical support and administration, types of devices used, implemented forms of educational work, and advantages and disadvantages of distance education.

In the summarizing part of the questionnaire, students were asked to formulate proposals on improving the quality of distance education.

The questionnaire for teachers contained questions that correlated with the questionnaire of students and original items. This approach allowed the authors to consider the differences in the opinions of teachers and students, get an objective result of the survey, and make further optimal and informed organizational decisions.

The respondents were asked the following:

- Provide general information (under the condition of anonymity): faculty, position, and academic degree;
- Evaluate several parameters in qualitative terms from "bad" to "excellent." These parameters are as follows:
  - Level of adaptation to distance learning;
  - Convenience of teaching in a new environment;
  - Level of information about changes in the educational process implemented in distance form;
  - Degree of convenience and satisfaction with the classes held in a distance format, the convenience of using the electronic educational environment of the university;
  - Level of students' motivation to study in the given conditions.
- Analyze possible changes in the level of motivation and psychological and physiological burden on teachers and students caused by the transition to distance learning;
- List the used distance learning tools, electronic resources used prior to restrictions, electronic resources for getting feedback from students (including receiving completed assignments for review);
- List technical problems and personal difficulties, claims on technical support and administration, types of devices used, implemented forms of educational work, and advantages and disadvantages of distance education.

In the summarizing part of the questionnaire, teachers were asked to formulate proposals on improving the quality of distance education and answer the question about the preferred form of training (subject to the choice).

Processing, systematization, and analysis of the results of the questionnaire (taking into account the counterversion of teachers and students) allowed us to identify limitations of the potential of the educational process, the difficulties of full use of its patterns for learning and development of personality of students (i.e., aspects of educational deprivation in a distance learning environment).

10.3 Results

An anonymous questionnaire covered 480 students in the 1st–4th years of study and 135 teachers.

The evaluation of the results allowed us to develop general recommendations on improving the quality of education in distance learning. To identify the presumed presence of educational deprivation in the given conditions, it is enough to analyze the results of the survey only on the item "disadvantages of distance learning." Table 10.1 presents the generalized results of the survey of students on this item.

Thus, 35% of students said that they experienced emotional discomfort and a lack of direct communication with teachers. This fact demonstrates the limiting impact of distance learning technologies on training the professionals who will interact with people during the performance of future professional activities, and even more so when it comes to the initial stages of training future teachers. Direct educational interaction with university teachers allows future teachers to learn and improve the mechanisms of social perception and interaction strategies optimal for the educational process.

Seventy percent of respondents indicated a lack of direct interpersonal communication with groupmates during distance learning, indicating social deprivation.

Eighty percent of students pointed out the time savings during distance learning since this format of classes eliminates the need to spend time getting to the university and back. Simultaneously, 74% of respondents noted an increase in the number of assignments requiring independent work, which forces students to limit their leisure, recreation, and free communication. The increase in the duration of independent training and, consequently, the time spent by students at the computer leads to manifestations of motor deprivation, that is, a lack of physical activity.

Forty percent of students emphasized that distance learning provides the opportunity to master the learning material and perform tasks at an individual pace.

Generalized results of the survey of teachers (on the item "disadvantages of distance education") are presented in Table 10.2.

Seventy percent of teachers noted a lack of direct interpersonal communication with colleagues and students during distance learning, indicating social deprivation.

Table 10.1 Generalized results of the survey of students (on the item "disadvantages of distance education")

Disadvantages	Respondents, %
Increased volume of tasks requiring independent work	74
Lack of direct interpersonal communication with groupmates	70
Emotional discomfort and lack of direct communication with teachers	35
Lack of physical activity	32
Other	<30

Source Compiled by the authors

Table 10.2 Generalized results of the survey of teachers (on the item "disadvantages of distance education")

Disadvantages	Respondents, %
Increased teaching load	76
Lack of direct interpersonal communication with students and colleagues	70
Technical limitations in laboratory work, group work, discussions, etc	64
Expanded opportunities for students to carry out assignments not on their own	58
Other	<30

Source Compiled by the authors

The lack of direct interaction between the lead teacher and the assistant negatively affects the quality of teaching joint disciplines.

Seventy-two percent of teachers pointed to the time savings during distance learning due to eliminating the need to get to the university and back. Simultaneously, 76% of respondents noted an increase in psychological and physiological load on the teacher.

The opportunities for students to complete assignments not on their own is an urgent problem for teachers. Some students remotely exchange completed work, as indicated by repetitive wording of answers and similar errors. This fact was noted by 58% of the surveyed teachers.

Technical capabilities of some electronic educational platforms and tools do not allow full laboratory work using the special equipment. Moreover, it is sometimes impossible to carry out interactive and group tasks and exercises. This shortcoming was noted by 64% of the respondents. The training opportunities in distance education for future teachers of physical education are also particularly limited.

Thus, the empirical study revealed the limitations of the potential of the educational process and the impossibility of full use of its regularities for learning and personal development (i.e., educational deprivation in distance learning).

10.4 Conclusions

Since distance learning in Russia is intensively developing, it is necessary to study the possibility of manifestations of explicit and implicit educational deprivation and develop necessary preventive measures.

The authors identified some of the limitations of socio-educational and developmental functions of distance learning in the professional training of future teachers.

Improving the quality of professional education in the conditions of distance learning requires the development of standards for remote interaction, digital content, and optimal and appropriate interactivity of online courses, taking into account the specifics of the areas of professional training.

It is advisable to reduce the share of digital educational platforms that do not allow for receiving instant feedback from participants in educational interaction.

It is vital to ensure technical support to improve the uniqueness of individual assignments and student responses posted in the e-learning environment.

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Part II
The Role of Digital Higher Education for the Sustainable Development of Regions in Central Asia and Russia

Chapter 11
Budgetary Policy Efficiency of Regions as a Tool for the Sustainable Development of the Educational Potential of the Russian Federation

Nadezhda I. Yashina, Oksana I. Kashina, Nataliya N. Pronchatova-Rubtsova, Olga I. Kuryleva, and Elena V. Romanovskaya

JEL Codes H61 · H7 · I22 · I23

11.1 Introduction

The urgent problem of public authorities is the development of an effective financial policy focused on the growth of people's well-being. The happiness of people, as sociological studies show, is formed by their satisfaction with life. Moreover, of course, education, health care, and spiritual wealth predetermine the well-being of the population and the understanding of happiness. It is impossible to imagine Russia, like other developed countries, without a good level of education. In the modern world, investing in a person and understanding him as the main value is important to assess the opportunities both on the part of the government and on the part of the population by investing in raising the educational level, and the country's intellectual capital (Becker, 1994; Charles & Diaz, 2017; Domenech et al., 2016). Digitalization in many areas determines the requirements for higher education institutions, graduates who have to develop the economy, health, and education for the benefit of the country. On the one hand, the source of financial resources is GDP, and on the other hand, economically developed systems are characterized by an increase in the share of intangible products in the structure of GDP. Consequently, the budgetary policy of the regions must be aimed at increasing the educational potential, which allows

N. I. Yashina (✉) · O. I. Kashina · N. N. Pronchatova-Rubtsova
Lobachevsky Nizhny Novgorod State University, Nizhny Novgorod, Russia

O. I. Kuryleva · E. V. Romanovskaya
Minin Nizhny Novgorod State Pedagogical University, Nizhny Novgorod, Russia
e-mail: alenarom@list.ru

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mastering modern technologies and high-tech industries in the context of digitalization for the growth of added value, and most importantly, improving the quality of the social capital of society (Charles & Zegarra, 2014; Volkov, 2015).

11.2 Methodology

The methodological base of research—methods of mathematical statistics, system and economic analyses. Diagnostics of educational potential was based on the use of calibrated indicators calculated according to the data of the Federal State Statistics Service and the Ministry of Finance of Russia for 2016–2018.

The research methodology includes the following main stages:

1. Formation and substantiation of quantitative indicators reflecting the effectiveness of the budgetary policy of the regions. This policy is allowing the development of the educational potential of the Russian Federation.
2. Formation and substantiation of quantitative indicators characterizing the educational potential.
3. Standardization or calibration of indicators for a comprehensive evaluation of the effectiveness of the regional budgetary policy as a mechanism for the sustainable development of the regional educational potential, which makes it possible to compare and present the proposed indicators in a single coordinate system. The growth of the values of some indicators contributes to a decrease in the effectiveness of the budgetary policy of the regions; on the contrary, their increase is associated with other reasons.
4. Determination of the consolidated ranks of the budgetary policy, taking into account the risk of budget execution for three years (2016–2018).
5. Determination of the summary ranks of the educational potential of the regions.
6. Carrying out the classification of the regions based on the integral summary ranks to improve the efficiency of the budgetary policy for the sustainable development of the educational potential.

Let us consider the application of the proposed methodological tools for assessing the effectiveness of the budgetary policy of the regions.

An effective budget policy is understood as a policy in which regions have an increase in the tax base, a high collection of tax payments to the budget, full provision of financing of all priority, socially significant and investment budget expenditures, a reduction in arrears, an optimal structure of government borrowing, and no accounts payable for all expense items. The budgetary policy is characterized by specific indicators, which are calculated based on budget reports (Charnes et al., 1978, 1994; Chigarin, 2015; Cooper et al., 2000; James, 2015; Kornilov et al., 2019; Saisana et al., 2005). These include the financial stability ratio; the ratio of financing social expenditures by own income; the ratio of financing production sectors with own funds; interest expense ratio; debt burden ratio; an indicator of the potential reserve of financing social expenditures. In addition to these indicators, based on the reports,

we will calculate the coefficients of the ratio of the consolidated budget revenues and the GRP, the ratio of the expenses of the consolidated budgets of the regions and the GRP, the ratio of the expenses and revenues of the consolidated budgets of the RF subjects.

The operational network indicators, indicators of regional digitalization, and investment innovation components of the region characterize the educational potential.

Operational and network indicators include: numbers of students enrolled in undergraduate, specialist, master's programs (thousands of people), admission to undergraduate programs, specialties, master's degree (thousand people), graduate bachelors, masters (thousand people), coefficients of material and technical security in educational institutions, training of personnel of higher qualification, their employment, involvement in the labor market, involvement in science (on inventions). They are important not only as a reference for the country's education but also its qualitative component (Saisana et al., 2005).

Indicators of regional digitalization include coefficients of technology development, technology use, information, and communication support (personal computers, servers), and network utilization rates (organizations that used the Internet, including broadband access).

Indicators characterizing investment in innovation include coefficients of production opportunities, cost of innovation, the volume of innovation, investment development, and investment distribution.

In addition to these indicators, the following are included: growth rates of industrial production, production growth by type of economic activity, and average monthly nominal accrued wages of employees of organizations (rubles).

For calibration, formulas (11.1, 11.2) are used: when minimizing indicators—(1), when maximizing indicators—(2), while values are from 0 to 1:

$$K_{ij}^{*} = \frac{K_{ij} - K_{i\,\min}}{K_{i\,\max} - K_{i\,\min}}, \tag{11.1}$$

$$K_{ij}^{*} = \frac{K_{i\,\max} - K_{ij}}{K_{i\,\max} - K_{i\,\min}}, \tag{11.2}$$

where K_{ij}^{*}—calibrated indicator ith proposed indicator for assessing the effectiveness of budgetary policy in jth region,

K_{ij}—the estimated value i of the proposed indicator of the effectiveness of budgetary policy in the j region,

$K_{i\,\max}$—the highest estimated value of the i index among the analyzed subjects of the Russian Federation,

$K_{i\,\min}$—the smallest calculated value of the ith indicator among the analyzed subjects of the Russian Federation.

In conditions of instability of various indicators of socioeconomic development, and volatility of modern public finances, we can take into account the variability

of the values of indicators characterizing the effectiveness of financial policy in the region.

The total cumulative complex calibrated indicator is determined by the formula ($SKKROP^*_{ij}$) (11.3):

$$SKKROP^*_{ij} = \frac{K^*_{ij}}{\sigma_i}, \tag{11.3}$$

where K^*_{ij}—the ith calibrated indicator for assessing the effectiveness of the budgetary policy of the jth region, taking into account volatility K^*_{ij},

σ_i—standard deviation of the i calibrated index among the analyzed subjects of the Russian Federation.

To determine the aggregate calibrated indicator, all calibrated coefficients are summed up for each region (4):

$$SKK^*_j = \sum_{i=1}^{n} K^*_{ij}, \tag{11.4}$$

where SKK^*_j—a consolidated calibrated indicator for assessing the effectiveness of the budgetary policy of the jth region, the lower its value, the higher the efficiency.

Then the regions are ranked according to the assessment of the effectiveness of budgetary policy (Table).

For the calibration of indicators reflecting educational potential, formulas (11.1) and (11.2) are used. Further synthesis is determined by a calibrated factor in educational development.

11.3 Results

Empirical results of a study using the proposed methodological tools are presented in Table 11.1.

Based on the research conducted, it can be concluded that the effectiveness of budget policy is beyond doubt in Moscow, Saint Petersburg, Murmansk Region, Leningrad Region, the Republic of Tatarstan, the Republic of Komi. Also, the level of development of educational potential is characterized by the number of students, students in the programs of bachelor's degree, specialist, master's degree, admission to study in programs of bachelor's degree, specialist, a material and technical provision in educational institutions, training of highly qualified personnel, their employment, involvement in the labor market, and science. The regions presented above are "leading regions". The Nizhny Novgorod region entered the top ten leaders in the development of educational potential. However, it is important to analyze the reserves for better implementation of budget policy.

Table 11.1 Summary table of the effectiveness of budgetary policy and sustainable development of the educational potential of the regions (fragment)

	SKKROP 2018	Rank ROP 18	SKKEBP 2018	EBP Rank 2018	Total SKKEBP for three years	EBP rank for three years	Integral rank (ROP, EBP)	Place
Moscow city	20.538	1	2.899	14	9.804	10	11	1
St. Petersburg city	21.685	6	2.575	13	9.290	7	13	2
Murmansk Region	21.597	12	3.018	6	8.550	2	14	3
Leningrad Region	21.013	2	3.050	16	9.967	12	14	4
Republic of Tatarstan	21.016	4	3.298	21	9.876	11	15	5
Komi Republic	21.850	14	2.654	7	9.312	8	22	6
…								
Nizhny Novgorod Region	21.042	10	3.217	18	10.647	20	30	10
Moscow Region	20.296	9	3.776	34	10.667	21	30	9
Tyumen Region	24.265	34	2.052	4	7.699	1	35	11
Tula Region	22.946	24	3.195	17	10.208	15	39	13
Chelyabinsk Region	23.272	31	2.996	10	9.451	9	40	12
Vologda Region	23.143	27	3.061	12	10.052	13	40	14
Amur Region	21.544	7	3.971	31	11.900	36	43	15
Kemerovo Region	23.584	40	2.652	3	9.014	5	45	16
Sakhalin Region	23.317	23	4.536	20	10.672	22	45	17
Irkutsk Region	23.780	45	2.706	11	8.962	4	49	18
Vladimir Region	23.680	29	3.900	25	11.093	25	54	19
Belgorod Region	23.241	20	3.496	38	11.858	34	54	20
Rostov Region	23.939	37	3.372	33	11.128	26	63	22
Ulyanovsk Region	22.914	28	3.759	46	11.872	35	63	21
Republic of Adygeya	22.565	13	4.688	58	13.982	51	64	24
Magadan Region	21.239	5	5.252	66	15.214	59	64	23
Kirov Region	22.868	18	4.566	54	13.835	50	68	25
Khabarovsk Territory	22.450	15	5.706	77	14.741	54	69	26
Ryazan Region	23.830	33	3.938	37	12.158	38	71	27
Krasnodar Territory	24.014	56	3.401	24	10.325	16	72	28
Lipetsk Region	23.937	48	3.511	27	11.073	24	72	29
Stavropol Territory	22.626	25	4.190	51	13.075	47	72	31
Tver Region	23.850	42	3.759	43	11.688	31	73	30
Jewish Autonomous Region	21.495	11	5.227	65	16.312	65	76	34
Orenburg Region	24.163	61	3.118	19	10.430	17	78	32

(continued)

Table 11.1 (continued)

	SKKROP 2018	Rank ROP 18	SKKEBP 2018	EBP Rank 2018	Total SKKEBP for three years	EBP rank for three years	Integral rank (ROP, EBP)	Place
Republic of Bashkortostan	24.268	60	3.440	26	10.449	18	78	33
Altai Territory	20.819	3	6.547	81	18.870	75	78	36
Kursk Region	23.575	35	3.903	36	12.431	44	79	35
Samara Region	23.843	59	3.287	29	10.971	23	82	37
Voronezh Region	24.324	49	3.695	42	11.815	33	82	38
Primorye Territory	23.997	57	3.890	44	11.461	29	86	39
Chuvash Republic	23.871	46	3.992	50	12.204	40	86	40
Novosibirsk Region	24.812	73	3.257	15	10.107	14	87	42
Krasnoyarsk Territory	24.349	68	3.499	23	10.507	19	87	41
Republic of Karelia	23.589	32	4.707	64	15.156	57	89	43
Tomsk Region	24.231	63	3.634	52	11.450	28	91	44
Tambov Region	23.053	26	5.493	70	16.502	66	92	47
Penza Region	23.660	50	4.297	45	12.389	43	93	45
Kostroma Region	23.103	19	5.798	80	18.172	74	93	49
Udmurtian Republic	23.650	53	3.729	48	12.344	42	95	46
Kamchatka Territory	23.167	22	6.322	79	18.016	73	95	52
Republic of Ingushetia	19.467	16	6.508	84	20.067	79	95	51
…								
Kaliningrad Region	26.966	66	6.302	86	19.749	78	144	77
Republic of Kalmykia	26.066	82	5.432	74	16.980	68	150	78
The Republic of Daghestan	28.587	83	5.516	76	17.440	69	152	79
Karachayevo-Chircassian Republic	25.164	78	6.651	83	19.215	77	155	80
Kabardino-Balkarian Republic	26.508	74	21.245	88	45.948	81	155	81

Source Calculations of authors based on data of the Ministry of Finance of the Russian Federation and the Federal Service of State Statistics

The "outsider regions" in all directions have also been identified: the Republic of Kalmykia, the Republic of Dagestan, and the Karachay-Cherkess Republic of the Kabardino-Balkarian Republic.

11.4 Conclusion

Indicators for sustainable development of educational potential are among the key components of human capital. In this regard, assessing the effectiveness of regional budgetary policies plays an important role in understanding the importance of investing in human capital.

The research carried out in this work allows us to draw several important conclusions. First, the sustainable development of educational potential largely depends on the sustainability of regional public finances. The methodology developed by the authors for a comprehensive evaluation of the effectiveness of the budgetary policy of the regions aimed at sustainable development of education. Now it is possible to rank territories for making effective financial decisions aimed at improving the quality and availability of education in the regions.

Secondly, the authors assessed the relationship of the developed standardized indicators of the sustainability of public finances with indicators of education development. Increasing the indicators of sustainable development is possible through reforming the system of financing educational institutions, aimed at increasing the availability of educational services, and developing innovations in education.

The theoretical significance of the study lies in the development of theoretical aspects of assessing the effectiveness of budgetary policy to ensure the high educational potential of Russia in the context of digitalization. The practical implementation of the proposed methodological toolkit makes it possible to classify the territories based on their ranking according to the integral evaluating of the effectiveness of budgetary policy and educational potential of the regions on the conditions of digitalization. Thus, it becomes possible to make effective managerial financial decisions that contribute to improving the quality and accessibility of education. Decisions are focusing on training highly qualified personnel influencing the development of human capital as the main value of the government.

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Chapter 12
Specifics of PR Activities in Startups

Irina S. Miller and Irina A. Gereykhanova

JEL Code M 39

12.1 Introduction

Startups are a quite noticeable phenomenon in the global economy. According to the analytical company SV Insights, only the number of so-called “unicorns"- startup companies with a value of less than a billion dollars, is more than four hundred (and primarily these are American and Chinese companies), and their combined market capitalization exceeds a trillion dollars (CB Insights, 2021). A much larger number of startups have not yet reached this level, but they are developing successfully and have a chance to add to this list over time. Thus, in terms of its total potential, the startup industry is quite comparable to the economies of large states.

At the same time, a huge number of startups fail without achieving success, and only in the first year of their existence, at least 70% of such companies go out of business. It is extremely important to note that a large proportion of startups “die” or do not develop as planned, not because of marketing mistakes, but because of ill-conceived communications with both the external and internal environment.

In Russia, the task of ensuring economic growth through the creation and development of innovative companies is also described as important in a number of policy documents. At the same time, so far only one such company from Russia—the nanotechnology startup OCSiAl (ROSNANO, 2019) has entered the list of “unicorn

I. S. Miller (✉) · I. A. Gereykhanova
Pyatigorsk State University, Pyatigorsk, Russia
e-mail: miller@pgu.ru

I. A. Gereykhanova
e-mail: rumachik@pgu.ru

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companies", and in the best case, several more startups may soon claim this status. At the same time, the domestic practice of developing the startup industry demonstrates, for a number of reasons (including insufficient development of PR tools or their incorrect use), even a greater relative prevalence of destructive development than foreign ones. All these highlight the relevance of the task of researching PR in a startup as one of the important factors contributing to the achievement of large-scale economic goals.

12.2 Methodology

To identify the specifics of PR activities in startups, a comparative analysis of the existing approaches to the definition of the concept of "startup" was conducted, using the work of such researchers as Paul Graham, Stephen Blank, Morgan Brown, and others. In order to identify the dynamics of the development of startups, their success, and the financial market share they occupy, the statistical data of the websites CB Insights (2021), RUSNANO (2019), etc., were analyzed.

The study used systematic and structural-functional approaches, as well as analytical methods. The systematic approach allowed us to consider a set of conditions that affect the development and success of startups. The structural-functional approach made it possible to identify the key subjects of interaction, as well as the main areas of PR activities of startups that contribute to the formation and maintenance of constructive communications with the external and internal environment.

12.3 Results

In the scientific literature and practice, the term "startup" is still interpreted very broadly and ambiguously. It is believed that the term first became known after appearing in Forbes and Business Week publications in the 1970s, began to denote a special type of organization and became as widespread as possible in the second half of the 1990s, when the so-called "dot-com bubble" was formed (Sun, 2011).

A large number of startup definitions focus on the fact that it is a newly formed organization. Thus, the Merriam-Webster dictionary emphasizes that this is a "young" commercial enterprise (Dictionary by Merriam-Webster, 2020). Similarly, the term "startup" is interpreted in a number of other authoritative dictionaries as "a business or undertaking that has recently begun operation" (The American Heritage Dictionary of the English Language.(2020). However, practitioners emphasize that age is not always a reliable criterion. For example, it is indicated that even a company with a 5-year history can still be a startup, but time still matters, and it is difficult to imagine a startup older than ten years (Robehmed, 2013).

Other authors object that after three years in business, the vast majority of startups move to a different status. This is often accompanied by such quantitative and

qualitative indicators as a takeover by a larger company, an increase in the number of employees and team members, the sale of their shares by the founders, etc. Often, the end of "startuphood", no matter how ironic it may sound, is often associated with the moment when the company begins to generate a steady profit (Robehmed, 2013).

Paul Graham argues that a startup is a company specifically created to grow quickly, and all the other things that are commonly associated with startups just accompany such growth (Graham, 2012). The company does not necessarily have to work in the technology sector, take venture capital financing, etc.—these features are secondary. Only a few of the millions of newly emerging companies can be considered startups. Stephen Blank, the author of a well-known textbook on startups, focuses on the fact that startups operate in search mode (Blank, 2012). If established companies implement business models in which consumers, their problems, and desired product characteristics are known in advance, then the startup, on the contrary, works in search mode, trying to find a reproducible, profitable business model. In essence, it is a "series of untested hypotheses" that require verification.

This definition is developed by Eric Ries, who developed the concept of "lean startup" (Ries, 2011). He emphasizes that a startup is an enterprise that aims to develop new products and services in conditions of extreme uncertainty. This means that all the actions of a startup are a kind of experiment for testing hypotheses (about a product, a customer, etc.); then a startup is a constantly learning and developing organization that reproduces the feedback cycle "create- evaluate-learn".

Summarizing the above, we formulate our own definition. A startup is a temporary organization created for the practical implementation of an innovative idea shared by its participants by searching for a scalable, reproducible, and profitable business model in conditions of high uncertainty using cyclic feedback technologies as a way to remove such uncertainty.

On the path of transformation from a startup to a "non-startup" organization, as a rule, goes through several main phases. As a startup develops, the number of entities engaged in its activities increases in one way or another. The classification proposed by business development specialist Morgan Brown identifies five key stages of the startup life cycle: problem/solution fit, minimum viable product, product/market fit, scale, and maturity (Brown, 2019).

At the first stage, there is only the idea of the product, and the first thing that the startup has to do is to clarify the problem that such an idea is designed to solve, and to find an answer to the question of whether the proposed solution will effectively solve it. This is the very moment when the first communication of the startup with the external environment is established, and the hypothetical target users of the product help to verify the usefulness of the idea and move on to the next stage, at which the so-called minimum viable product (MVP) is created.

The goal of this stage is to test the hypothesis about the product with the minimum possible investment of time and capital. It is necessary to identify and confirm the demand, as well as to predict the consumer behavior of potential customers. After such an assessment, it is possible to identify opinion leaders and influencers who can have a significant impact on the further promotion of the startup and its product.

At the third stage, the product is connected to the market—the product develops, receiving more and more feedback (requiring a timely response to make operational changes), gaining new users who are willing to pay for it (at earlier stages, this usually does not happen—on the contrary, the startup can encourage testing using its own funds). At this stage, the target audience is further refined and segmented, the market channels for promoting the company and the product are clarified, and the most attractive elements and properties of the product are highlighted from the point of view of users.

At the fourth stage, when there is confidence in all elements of the market environment and product characteristics, when most of the uncertainty is removed, the company scales the business. The startup dramatically activates work with potential consumers through all previously identified channels, and the product goes out of the phase of experiments with consumer characteristics and acquires sustainability and stability.

At the fifth stage, the market is saturated, growth slows down, and the startup enters the maturity phase. Individual organizations continue to invest in growth teams, expanding their business through additional localization, working with related products and markets. In any case, at this stage, the startup reaches the point where it virtually ceases to be a startup.

Some researchers suggest defining a different classification of the time stages of a startup's development path. The most concise of them contains only three such stages: bootstrapping stage, seed stage, and creation stage (Salamzadeh & Kawamorita Kesim, 2015).

At the first stage, the founder is mainly engaged in individual activity to turn his idea into a profitable business, which involves creating a team, using his own finances or along with financing from family and friends for the first steps in product development. Sometimes this stage is defined as a set of highly creative ways of acquiring and using resources without resorting to borrowing (Freear et al., 2002). The main tasks of the founder at this stage are to demonstrate the feasibility of the project and the fundamental ability to work with financial flows, to form and manage a team, and to find an interested consumer. External investments at this stage are absent or come from the so-called "angels"—those who invest their own (usually small) funds in projects and are ready to take on high risks of project failure at the earliest stages.

At the second stage, a full-fledged teamwork is carried out, a prototype (a minimum viable product) is developed, the success of the startup is evaluated, and support mechanisms (such as accelerators and incubators) are selected, and the level of attracted investments increases.

The third stage involves entering the market, selling your own product, and hiring employees. This stage ends with a fully formed organization that is ready to work with large investments and become something different from a startup.

The boundaries of a startup are always quite fluid, because, according to PayPal founder Peter Thiel's definition, a startup is the maximum number of people you can convince of your plan to build an alternative future (Thiel, 2014). Therefore, we will consider these subjects.

The key figures of the startup, of course, are its founders. Sometimes a startup is built by a single founder, but usually "average startup" has two or more founders. A single founder is a huge risk for anyone dealing with a startup. According to Paul Graham, this primarily indicates that this founder either inspires little trust, or does not know how to convince people of the success of his ideas. But even if the founder's environment is mistaken and is not able to evaluate a nontrivial idea, in any case, "starting a startup is too hard for one person" (Graham, 2006). Therefore, the founder (the carrier of the idea), when he does not have sufficient resources for independent work, suggests that like-minded people move to the category of co-founders in order to use their skills to implement his idea.

At the "zero stage", a startup thus consists of the founder trying to convince his inner circle that the idea he has proposed is valuable and that it should be supported. This interaction is called "The three F's"—interaction with friends, family, and fools. If the family and friends in this formula are clear—the first are sources of initial funding and moral support, carriers of valuable life experience, the second are sometimes sources for recruiting a team, then the third component requires clarification. "Fools" are those who believed in an [crazy] idea and invested in it at the very beginning of the business, with extremely high risks. The "fools" in the formula (which does not carry a generally negative connotation) are most often understood as non-professional investors who do not know the founder well enough to enter the circles of "family" and "friends". At the same time, they are attracted and captured by the idea, the charisma of the founder, and other similar factors that force them to take high risks of early investments. Thus, in contrast to the broad interpretation of "fools" as all entities investing in a startup at the earliest stage, we will use a narrower definition with an emphasis on the lack of professionalism of investors.

Early-stage professional investors differ from them in their motivation, capabilities, and level of understanding of the area in which they invest. Among such investors, business angels and venture capital funds are the most common. Often the differences between the former and latter are presented in this way: the angels are invested at an earlier stage, even before the release of the MVP or prototype, and the funds appear later. Although this is true, there are many other differences (Dmitruk, 2019).

For example, angels invest their own funds, while venture funds work with the attracted funds of other investors, including institutional ones. This affects the average check of a startup: for angels, its size can range from several thousand to several hundred thousand dollars, while funds usually invest at least half a million dollars. In addition, the speed with which financial decisions related to startup investments are made in the fund (both due to larger amounts of funds and due to more bureaucracy) is significantly lower than that of angels, and can take many months. For the same reasons, communication with angels is usually less formalized and involves less complex and rigorous reporting. Communication with angels is more "personalized", and therefore preference is given to projects that are geographically close to the investor.

Another type of entity whose participation is possible at an early stage is various types of grant funds. If the activities of a startup can contribute to the solution of

their main tasks, funds can also be obtained on a grant basis (although such sources of funding for a startup are quite atypical).

As a startup moves toward product launch and growth, more and more conservative investors are engaged in the process of interacting with it, for example, "classic" investment funds, banks, and other credit institutions.

As a rule, only at the final stage, mass investors are added to the list of entities involved in the startup's activities. In the classic version, this happens according to the scheme of initial public offering (IPO). However, in recent years, there have been more and more deviations from this sequence of events, and projects often receive massive public funding at the earliest stages of development.

This is due to the fact that there is a relatively recent technological infrastructure that allows for easy and convenient crowdfunding. The crowdfunding platform acts as an intermediary and a tool for collecting and accounting for funds received from users interested in a particular project placed on it through remote electronic payments, bank cards, money transfer systems, etc. Crowdfunding is divided into three main types: crowdfunding, crowdlending, and crowdinvesting. Crowdfunding is not a new phenomenon, but it was in the past decade that crowdfunding platforms have actively developed and have gained mass popularity—Kickstarter, Indiegogo, etc. If at first the main areas of their activity were the financing of creative music groups, participants of political companies, charity, etc., now it is startups, especially technological ones, that occupy a prominent place among the recipients of support.

At the same time, crowdfunding is a kind of charity that least obliges the recipient. As a rule, in exchange for donations, the donor is granted certain privileges, but often they are symbolic (for example, it can be a mug with the symbols of the project, inclusion in the lists of honorary members of the community, etc.). Sometimes the donator is given priority right to purchase a future product, or depending on the amount of the donation, it is promised to be delivered at the beginning of production.

In such a scheme, a startup, in fact, acquires not only the first "investors", but also the first buyers at the stage when it has nothing but an idea. At the same time, the crowdfunding community is the most unassuming "investor", who does not require shares in the business in return and is ready to bear risks and to deal with the complete loss of their funds in the event of possible failure of the project. In contrast, crowdinvesting already involves certain obligations to provide securities to the company or shares in the authorized capital in proportion to the investment.

Finally, crowdlending is the collective lending of a startup. Compared to a traditional bank loan, which is extremely difficult or even impossible for a startup in the "zero phase", the community of interested individuals with free funds makes such an opportunity real, often providing conditions and rates much more profitable than bank ones.

In recent years, another tool for crowdfunding startups has been massively developed—the so-called initial coin offering (ICO). This form of fundraising is closely linked to the development of blockchain technologies in general and cryptocurrency projects in particular. At the same time, projects distribute their "coins" (tokens) in a cryptographically secure way among ICO participants, who pay for their purchases (usually through cryptocurrencies). These new technologies have provided a real

boom in ICO projects, which allowed startups to raise more than six billion dollars in 2017 alone, and more than twenty billion dollars in 2018 (Coin Market Cap, 2021). At the same time, many projects were fully funded in a matter of seconds.

The peculiarity of internal PR in startups is that the degree of personal informal interactions in it is much wider than in an established traditional organization, where most of the relationships are subject to job descriptions and norms. Therefore, interpersonal interaction and ways to resolve conflicts become extremely important. First of all, this refers to the founders.

The figure of the founder (lei) of a startup is certainly key to its fate, so the interpersonal founder–co-founder conflict should hypothetically be considered critical for the survival of the organization. According to some reports, 62% of startups fail due to a conflict of co-founders (Vital, 2017). With a sufficiently large number of founders, conflicts may not be interpersonal, but personal-group (for example, the opposition of one of the partners belonging to the "unsuccessful types of co-founders" to all the others) or intergroup in nature. Group dynamics allow for the formation of tactical coalitions along various "fault lines": "technologists-businessmen", "romantics-pragmatists", "those who invest only labor – those who invest both labor and capital", etc.

When forming internal PR, it is also necessary to take into account the fact that employees who solve the production tasks of a startup are different from employees of "ordinary" organizations. Since the startup itself is always a risky enterprise, the choice of a startup as a place of work is associated with the decision to abandon stability in favor of prospects for rapid growth. This, in a sense, puts them on the same level as the founders of the startup. The normal practice in this regard is to offer employees a certain share in the business or the opportunity to purchase it on favorable terms. This often allows founders to pay "below-market" wages, provide less guarantees, and still retain highly qualified professionals.

However, there are also several reasons for potential conflicting communications. Valuable employees can eventually claim a large share in the company, which can be the reason for disagreement of the founders: after all, unlike the latter, employees were compensated for their work and resources spent. And in addition, there is a risk that valuable employees may leave the company, thereby depriving it of its unique competence, which can become critical for the further activities of the startup.

12.4 Conclusion

A startup is a temporary organization created for the practical implementation of an innovative idea shared by its participants. During the life cycle of a startup, the number of actors with whom it is necessary to establish strong relationships increases. The specifics of PR activity in a startup are determined by its features that distinguish it from a traditional organization, in particular, the large role of interpersonal factors, the highly stressful nature of the activity, resulting from the need to achieve results in a limited time, and low standardization of tasks.

The conflict potential of a startup increases due to the weak formalization of relations, often justified by the complexity of their specification and institutionalization in conditions of high uncertainty and risk, and the need to concentrate resources on the main activity, rather than on the formation of internal corporate PR. At the same time, spending resources on the latter at the initial stage always pays off in the future and in most cases makes it possible to prevent risks that are critical for the survival of the organization.

Significant new trends that change the composition of conflict actors in startups and the nature of their interaction are the widespread use of crowdinvesting and the active development of automated systems for conflict prevention and resolution through the construction of decentralized autonomous organizations based on blockchain technology; the latter seems promising, but does not yet provide sufficient efficiency.

The formula for creating internal PR in a startup, in addition to developing and documenting the basic "rules of the game" between the main actors, includes such key elements as: the creation and use of legal mechanisms (corporate agreement, shareholder agreement), economic motives (imbalances in the distribution of the founders' shares, options, and other schemes for granting rights to the founders and the team) and a psychological atmosphere (including a culture of strict compliance with obligations) that encourages the implementation of the developed rules; elaboration of scenarios for the development of events with the designation of the boundaries of acceptable and desirable (Descartes square).

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Chapter 13
Acceleration of Education in the Cluster Structure of the Economy

Vyacheslav V. Kazakov, Olga V. Vinogradova, Denis V. Nametkin, Alexander V. Vereshchak, and Svetlana B. Vereshchak

JEL Codes I250

13.1 Introduction

One of the progressive and effective models of socioeconomic development is the integration of cluster associations in the local area in the context of growing regional and international competition.

The founder of the clusters is considered to be Michael Porter, who analyzed the industry development in a dozen countries and revealed the focus on the systemic location of companies in the local region to ensure the growth of competitiveness due to the positive effect of cooperation between suppliers, manufacturers, and various institutions. Porter defines a cluster as a group of geographically adjacent, interconnected companies (suppliers, manufacturers, etc.) and related organizations (educational institutions, government bodies, infrastructure companies) operating in certain areas and complementing each other (Porter, 1998). Geographic proximity, interconnection, integration, interdependence, complementarity, and competitiveness are

V. V. Kazakov (✉) · O. V. Vinogradova
Moscow Technical University of Communications and Informatics Volga Vyatka Branch, Nizhny Novgorod, Russia

D. V. Nametkin
Russian State University of Justice, Nizhny Novgorod, Russia

A. V. Vereshchak
Chuvash State Agricultural University, Cheboksary, Russia

S. B. Vereshchak
I. N. Ulianov Chuvash State University, Cheboksary, Russia

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usually attributed to the universal properties of clusters (Andersson et al., 2004; Porter, 1998; Rosenfeld, 1997).

In practice, the creation of clusters was successfully implemented about half a century ago in the famous "Silicon Valley" in the United States; in the formation of the shipbuilding cluster in Norway, which had a beneficial effect on the development of coastal regions; forest, paper, and printing clusters in Finland, integrating different regions of the country; as well as a cluster that restructured the territory of the industrial center of Italy (Cruz-Jesus et al.; Hill, 2000; Hinderink, 2002).

World experience in the development of cluster integration shows the efficiency, growth of economic potential and competitiveness of their subjects. Clusters have opportunities to increase labor productivity and raise wages, which significantly increases the standard of living in the region where the cluster is located. A significant effect of the functioning of clusters is the activation of innovative activity, which provides its elements with an additional competitive advantage. Clusters are distinguished by their invaluable ability to generate new knowledge, entrepreneurial ideas, and technologies in the context of cooperation between educational, scientific, and entrepreneurial structures. In turn, the intellectualization of production and the development of the knowledge economy require the creation of clusters of a new type, with a pronounced strengthening of the role of actors creating, distributing, and using knowledge as a resource and as a product.

For all these reasons, let's formulate the main goal of this study as defining ways of developing education as a subject of cluster development of the economy. The achievement of the goal is realized through: (a) the choice of the category of the cluster that is most suitable for the development of the educational element, based on the structure, composition, and location; (b) determining the ways of formation or development of the educational subject of the cluster; (c) designation of the directions of acceleration of the educational subject of the cluster; (e) determination of target indicators of acceleration of education.

13.2 Methodology

The study was carried out using a complex of private and general scientific methods: abstract-logical, systemic, dialectical, situational approach, comparative analysis, and graphical reception of data visualization.

13.3 Results

Choosing a cluster category that is most suitable for the development of an educational element. The following strategies are used to create clusters, depending on the development of production, the state of market relations, the availability of resources, the location of the territory, the level of competition, directions of state

social and economic policy: geographic (choosing the place of the cluster structure of the economy); horizontal (one sector or several industries form a cluster); vertical (building a vertical of production with the allocation of an innovator); lateral (a combination of different sectors providing economies of scale); technological (based on the unification of related industries); focus (the cluster is concentrated around one large production or educational institution); qualitative (stimulating the development of innovations).

The most developed clusters are characterized by the following features:

- the presence of competitive and investment-attractive companies exporting a cluster product;
- the presence of regional competitive advantages that contribute to the development of the cluster (the corresponding geographical location, the availability of resources, the existing infrastructure, the presence of educational organizations, the availability of suppliers);
- geographical concentration and affinity (level of specialization of the region, active interaction of cluster subjects located in close proximity to each other);
- a wide choice of participants and the presence of a "critical mass" (a high level of employment in multiple subjects of the cluster, the presence of vocational and educational institutions, scientific institutes);
- the existence of connections and interactions between the subjects of the cluster (the presence of working relations and coordination of efforts between the members of the cluster) (Kudryashov, 2016).

Let's cite different opinions of scientists about the need for state influence on the creation and development of economic clusters due to the usual influence of the authorities on any processes in Russia. American researchers are of the opinion about the independence of the developed clusters from the protectionist policy of the state (Matray & Poisat, 2015). On the contrary, French economists question the possibility of creating and developing clusters without state support (Slaper & Ortuzar, 2015). We made a conclusion about the importance of the role of state influence on the development of economic clusters in Russia based on the materials of numerous scientific publications of Russian scientists.

So, clusters created in accordance with a focus or quality strategy are most suitable for the development of an educational element, in our opinion. Understanding the role of the leading subject of the cluster—a large company—is the basis for the choice. Also, a cluster that encourages innovative development and created or developed with the support of authorities can be selected.

It is worth paying attention to the geographical location as the choice of the location of the cluster. Moreover, the choice must be made not on the basis of proximity or remoteness from something (capitals, large urban agglomerations, etc.), but from the point of view of the effectiveness of the influence of the cluster on the level of development of the region. At the same time, geographical remoteness can serve as an additional competitive advantage for the educational segment of the cluster.

A significant part of attention should be paid to the demographic situation in the territory of the localization of the cluster when deciding whether to enter the

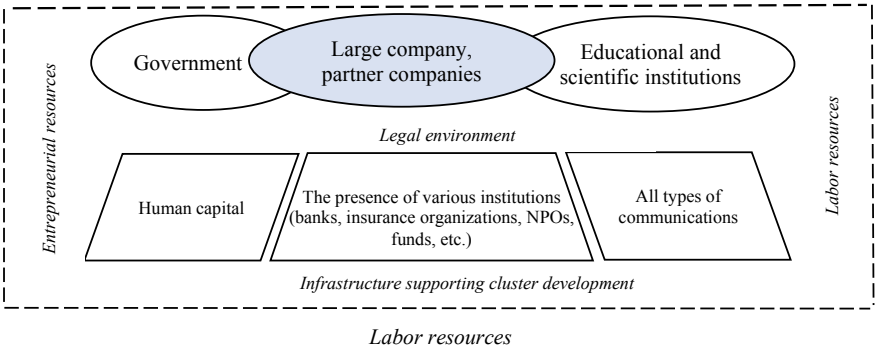

Fig. 13.1 Traditional cluster structure. *Source* The figure was prepared by the authors of the article

cluster. First of all, it is worth taking into account the level of provision of labor resources, their age composition, and the birth rate required for the resumption of the labor force. Entrepreneurial resources, the renewal and generation of which can be provided by the educational subject of the cluster to some extent, are of great importance for the development of the cluster. The traditional structure of a cluster that meets the requirements of its educational subject is shown in Fig. 13.1.

Considering the above, we state our choice and move on to the next task for the formation or development of the educational subject of the cluster.

Determination of ways of formation or development of the educational subject of the cluster. We propose to build the educational segment of the cluster as an out-of-space aggregation of the subject's elements based on infocommunication links, synergy of cooperation and competition, taking into account the reorientation of clustering in the information economy from an industry device to a system of socioeconomic relationships.

This decision is due to the possibility of using infocommunication links, IT technologies, telework, allowing the educational organization to be located outside the cluster region.

Let's choose a *modular structure of the educational segment* of the cluster based on the cluster simulation process described by Baranov, as well as the opinions of other researchers. The choice is also based on the fundamental control law of Ashby—"the theorem on the need for diversity", one of the consequences of which explains that the diversity of the system should be no less than the diversity of the controlled object (Baranov, 2020).

Let's include various elements in the modular device system to ensure the development of the educational segment of the cluster: large university (*core of the segment*); research centers (elements of type *A*); organization of vocational education (elements of type *B*); training centers for advanced training and retraining of employees (elements of type *C*); branch of noncore educational institutions of vocational education on an outsourced basis (elements of type *D*); university unit or outsourced unit that check and evaluate competencies on terms (elements of type *E*);

educational organizations geographically located in the cluster zone and under the supervision of the university (elements of type *F*).

The composition of the elements is determined on the basis of the cluster problems identified in various studies in terms of training and retraining of qualified workers and engineers. The effect of the cluster as a multiplier of employment in the region is also taken into account. A significant number of jobs are created by the infrastructure of the cluster (medical care, car service, housing repair and design, etc.), this also contributes to the development of educational activities in noncore specialties for the cluster (Kazeeva, 2016). The role of research centers is to create innovative technological and management processes, information technology, and intellectual property.

We consider it possible to *use the "third place"*, described by Komarova and found a place in the US educational system, in the activities of the educational segment as *innovations in the educational process*. "*Third place*" (or space) is a social environment that is separate from the two usual social conditions—at home ("first place") and office ("second place"). These can be libraries, parks, swimming pools, shopping centers, colleges, universities, etc. "*Third place*" has characteristics that collectively create a breeding ground for innovation: a place without commitment; "leveling" place (equal status of a person for all); communicative place (speaking activity); accessible place; adjustable place that gives the space a tone (Komarova, 2019).

"Third place" can be used in terms of retraining and advanced training of personnel in the educational process, in "brainstorming" in scientific research and other activities of the educational subject of the cluster.

It is necessary to consider the *potential sources of its financing*, in which all subjects of the cluster, including the authorities, should participate, having determined the structure of the educational subject.

The costs of small and medium-sized Russian businesses for the training of specialists are quite small. Based on this, it is worth considering the costs of large corporations in the form of loans and investment loans, sureties and guarantees, participation in authorized capital. In addition, measures of nonfinancial support from state corporations are of great importance for the scientific elements of the educational subject. This is project management, scientific, technical, and technological expertise of innovative projects, registration of trademarks, patents, etc. (Gokhberg, 2013). Based on the experience of state corporations in promoting education and science, it is worth involving large companies of the cluster in the financing process.

Subsidies for the fulfillment of the state assignment for the training of specialists of various levels are dominant in the financing of education in Russia. Existing experience in education confirms the stability of cash flows from students.

Potential sources of funding for the educational subject of the cluster are shown in Fig. 13.2.

It should be noted that, in addition to the financing procedure, it is required to determine the system of legal, organizational, and business relations with the elements of the segment and adapt it to a similar cluster system of relations and relationships for the successful functioning of the educational segment of the cluster.

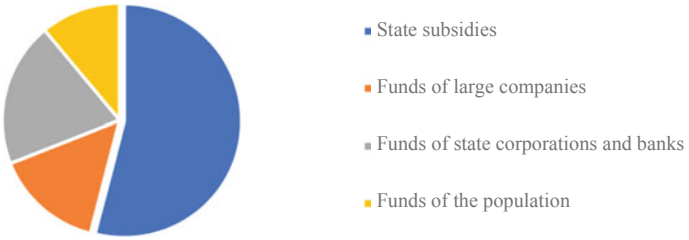

Fig. 13.2 Potential sources of funding for an educational entity. *Source* The figure was prepared by the authors of the article

We offer *ranking by weight coefficients* for the distribution of managerial efforts and determining the influence of the core of the university segment on the elements of the educational segment. We recommend including the indicators shown in Table 13.1 in the coefficient system.

Weight coefficient is calculated by multiplying the score and weight of the indicator. In this case, the indicator weight is determined by the expert commission of the segment core. Weight coefficients are calculated for each element of the educational segment of the cluster.

We propose to use a dynamic series of changes in external signals in time of an additive form, obeying regularities, to solve the problem of analyzing input data from the external environment, as well as to ensure the interaction of an educational subject with other elements of the cluster. To do this, let's build a dynamic element series, highlighting—a constant element (trend of the series), a cyclic element, a random element formed under the influence of unknown reasons, an element of comparability of the components of a dynamic series and a control element that sets the required trajectory of changes (Baranov, 2020).

Table 13.1 The system of indicators used in the distribution of management efforts in the educational segment of the cluster

No.	Indicator name	Indicator score	Determination procedure
1	Amount of proceeds from activities carried out in the interests of the cluster	Monetary (descending)	Responsible university employee
2	Significance in the activity of the cluster	Relative (descending)	Expert assessment
3	Innovative development	Score (descending)	Expert assessment
4	The volume of attracted material resources	Monetary (descending)	Responsible university employee
5	The number of the population of the cluster involved in the educational process	Quantitative (descending)	Responsible university employee

Source The table was compiled by the authors of the article

After summarizing the arguments and suggestions for determining the ways of formation or development of the educational subject of the cluster, we proceed to the next task of our study to designate the directions of acceleration of the educational subject of the cluster.

Designation of the directions of acceleration of the educational subject of the cluster. It is necessary to determine the directions for the further development of the educational segment of the economic cluster to achieve its sustainable growth.

For this purpose, we studied the opinions of various specialists published in scientific publications, and indicated the following directions of its development:

1. *Innovative scientific and educational activities.* When choosing this direction, we assigned a special role to the intensity of cooperation between the university (the core of the educational segment) → business structures → the state, accumulated by building an effective organizational and management model of interaction between the considered elements of the cluster. We propose to take into account the presence of a developed chain of links within the cluster and with various federal development institutions, a system of preferences and benefits for innovation when building a model.
2. *Improving the material and technical base of the elements of the educational subject.* Involvement in the practical part of the educational process of the developed industrial and technological base of the cluster companies, in our opinion, will contribute to the effective use of funds of educational entities, increase their competitiveness and prestige in the educational services market.
3. *The network device of the educational subject of the economic cluster.* Networkization is used as one of the promising management approaches (Serebryakova et al., 2020). The focus of this study is *geographically open networks* that allow to involve elements from other regions in the scientific and educational process, or allow the university itself to enter into clusters geographically remote from it. The network device will make it possible to fill the missing resources and competencies of the educational segment by establishing partnerships with their owners.
4. *Development of a scientific school in the direction of the economic activity of the cluster.* The choice of this direction is based on the possibility of attracting highly intellectual and highly professional personnel potential of the cluster in the scientific process. The success of involving practitioners in the scientific process is evidenced by domestic and foreign experience (Kokuytseva & Orlova, 2015). Interaction with the industrial sector of the cluster will provide an opportunity to generate ideas that are in demand at this stage, to attract experts and observers to the scientific process.
5. *Development based on synergy and economies of scale.* This direction is a priority in the acceleration of the educational segment of the cluster. An increase in revenue, an increase in the importance of the university and other elements can be achieved by differentiating and expanding the types of educational services,

increasing the number of students by age, profile, and type of education. Business stimulation of scientific developments will increase the prestige of the university and will contribute to the development of science and innovation.

It is necessary to provide target indicators for the development of the educational segment of the cluster in order to fulfill the control function of performance, summing up the results of the above about the designated areas of development. To do this, we turn to the last task of our study.

Determination of target indicators of acceleration of education. Let's propose a number of target indicators, determined based on the opinions of researchers reflected in various scientific publications, as well as existing Russian practice, to ensure the operational and strategic goals of the educational entity of the economic cluster (Notchenko & Vinogradova, 2017; Vinogradova, 2019). We suggest to carry out control annually. The determination of the *estimated value* is carried out independently by the educational subject, taking into account resource capabilities and target tasks. The name of the indicators, their estimated values, and the expected result are given in Table 13.2.

Table 13.2 Assessment of indicators of development of an educational subject of an economic cluster

No.	Indicator name	Estimated value	Result
1	Increase in the total number of students	Less than A%/more than A%	Negative/positive
2	The proportion of students in higher education programs	Less than B%/more than B%	Negative/positive
3	Increase in the number of students in secondary vocational education programs	Less than D%/more than D%	Negative/positive
4	Increase in the number of students in retraining and advanced training programs	Less than G%/more than G%	Negative/positive
5	R&D revenue growth rate	Less than F%/more than F%	Negative/positive
6	Growth rates of off-budget income	Less than N%/more than N%	Negative/positive
7	Increase in material and technical base	Less than K%/more than K%	Negative/positive
8	Quality of education (employment and career growth of graduates)	Less than L%/more than L%	Negative/positive
9	Increase in the areas of training and retraining of specialists	Less than W%/more than W%	Negative/positive

Source The table was compiled by the authors of the article

13.4 Conclusion

The approach to choosing a cluster category that contributes to the development of the educational segment was developed as a result of research. The ways of forming the educational subject of the cluster using the system of the modular device have been determined, the "third place" in the conduct of educational activities has been proposed, and the approach of entering the educational element into geographically remote clusters, taking into account the use of infocommunication links, IT technologies, telework, has been developed taking into account advanced scientific experience. The ranking of the elements of the educational subject of the cluster by weight coefficients is proposed to improve the efficiency of their management. A number of estimated indicators have been proposed as a control function of development.

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Chapter 14
Problems of the Formation and Development of the Interaction System of the Pedagogical University and the Region

Ekaterina P. Sedykh and Valeria A. Zhitkova

JEL Codes D20 · D70 · I23 · I25 · R58

14.1 Introduction

A modern university is not only a scientific and educational center of attraction in the region, but also an active element of socioeconomic development. The implementation of the third mission of the university, as a condition for its successful development, makes it necessary to respond promptly to the requests of the regional community, regional business structures, and regional authorities; to show social responsibility in relation to the environment; to support and develop direct participation in all social and socioeconomic processes in the region and in the country (Balmasova, 2016; Golovko et al., 2018).

The university needs to constantly maintain a balance between the interests of education and science, government and business structures, as well as between entrepreneurial interests in education and management, commercialization of science and social responsibility to all stakeholders (students, teachers, employers, the public). At the same time, the university is a socially responsible organization, it should be focused on public demand, flexible network cooperation, and social partnership (Belyaev, 2020; Sedykh et al., 2017).

The diverse nature of the requirements for the modern organization of higher education by the public, the state, and business determines the variety of forms of interaction of higher education organizations with the environment and is the basis for a constant search for the most effective and efficient forms of interaction.

E. P. Sedykh (✉) · V. A. Zhitkova
Minin Nizhny Novgorod State Pedagogical University, Nizhny Novgorod, Russia
e-mail: kettt@list.ru

E. G. Popkova and B. S. Sergi (eds.), *Digital Education in Russia and Central Asia*,
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Obviously, the effectiveness of cooperation increases many times, if the university interacts with stakeholders in the context of a single development logic, in accordance with the development strategy of the country, region, and the university itself, combining all cooperation activities into a single partner system (Passport of the national project "Education", 2021; Resolution of the Government of the Nizhny Novgorod region No. 889 of December 21, 2018 "On approval of the Strategy of socio-economic development of the Nizhny Novgorod region until 2035", 2021).

The existing models of universities: research, regional, passionate, project-oriented, entrepreneurial (Gagnidze & Gudz, 2017; Golovko et al., 2016; Kranzeeva, 2017; Sorokina, 2002; Titov, 2021) can no longer fully satisfy all the requirements for universities.

In such conditions, universities "are considered as the cradle of new entrepreneurial activity—in addition to their traditional tasks of research and education", they can act as equal partners "in the international highly competitive market", "actively compete for the best teachers and students and for research contracts with companies", cooperate with companies of various industries, nongovernmental research and development organizations, investors, professional service firms, as well as with other universities" (Sedykh et al., 2017).

The most successful universities purposefully position themselves as regional educational, scientific, and social centers and key investors in socioeconomic processes in the regions, because they realize the need to maintain and strengthen their positions in the competitive struggle of the preferences of all stakeholders with global educational and scientific centers with a developed system of online resources and serious financial capital.

14.2 Methodology

Goddard, Itskowitz, Clarke, Kranzeeva, Larionova, Lundwal, Nelson, Perfilieva, Sabato, Sidorova, Firsova, Chatterton, and others dealt with the problems of interaction of universities with society, business structures, and government (Bezuevskaya & Pelikhov, 2018; Golovko et al., 2016, 2018; Kranzeeva, 2017; Perfilieva, 2011; Sidorova, 2014). Various models of interaction between universities and all participants in socioeconomic activity were formed and described by the authors in the framework of the research.

The researchers considered two models according to the nature of the interaction of universities as centers of science and innovation with the external environment: "triangle"—a model in which each of the vertices symbolically represents a certain group of stakeholders from science, business structures, and government bodies; "triple helix"—a model that symbolizes the balanced interaction of three components of an innovative economy: universities, business structures, and government structures. Within the framework of the first model, the interaction of elements occurs in accordance with the principles of domination of state or business structures in order to introduce and implement innovations: one of the links is the leading one.

Within the framework of the second model, cooperation becomes more networked, hybrid institutional forms are created (Golovko et al., 2016, 2018; Kranzeeva, 2017; Sidorova, 2014; Smirnov, 2010).

The university plays the role of researcher, system or regional integrator, HR designer, depending on the nature of interaction with the environment and the expectations of stakeholders (Imperatives of Internationalization, 2013; Kogan et al., 2019). The nature of the campus of the university: compact, centralized or decentralized campus; the placement of the campus within the city or outside the city affects the interaction between the university and the environment (Gagnidze & Gudz, 2017; Korshunov et al., 2019). The interaction of members of cluster associations is implemented in accordance with the principles of network interaction, complementarity, mutually beneficial cooperation, voluntariness, geographical proximity, self-organization, consistency, controllability, activity, efficiency, development (Danilov, 2017).

The research results indicate the need to take into account the multi-vector activity of universities in the process of their interaction with various organizations and the formation of complex mechanisms for the implementation of such interaction.

Universities of the Russian Federation receive state support for the most effective development, including in the field of interaction with regional authorities and business structures within the framework of complex projects: the project to improve the competitiveness of leading Russian universities among the world's leading research and educational centers ("Project 5-100"), the project "Flagship Universities of Russia", the project "Universities as centers of space for creating innovations", the national projects (Passport of the national project "Education", 2021; Passport of the priority project "Universities as centers of innovation creation space", 2021; Resolution of the Government of the Nizhny Novgorod region No. 889 of December 21, 2018 "On approval of the Strategy of socio-economic development of the Nizhny Novgorod region until 2035", 2021; Resolution of the Russian Federation Government No. 211 of March 16, 2013 "On measures of state support for the leading universities of the Russian Federation in order to increase their competitiveness among the world's leading research and educational centers", 2021; Order of the Ministry of Education and Science of Russia No. 811 of August 7, "On the competitive selection of educational institutions of higher education for the financial support of development programs of federal state educational institutions of higher education at the expense of the federal budget in 2016–2018", 2015). Currently, a draft Strategic Academic Leadership Program ("Priority—2030") is being developed. The program involves the expansion of forms of interaction between universities, both in order to increase the efficiency of the activities of the universities themselves, and in order to increase the integration component in the interaction of business, science, and the state.

There are various options for institutionalizing the interaction of universities with public and social structures in the region, regional government, and business structures: regional clusters, concessions, consortia, coordinating bodies operating within the framework of multilateral agreements, technology parks, infrastructure sites, technical platforms, research and educational centers, etc. The university must

proceed from its own capabilities, take into account the deficiencies of the region and its priorities and the general context of innovative development in the country and in the world, choosing one or another form of institutionalization of interaction with regional structures. The chosen form of interaction should best respond to the modern challenges of innovative development of the socioeconomic sphere and contribute to the most effective solution of the set strategic tasks at the national and regional levels.

The most universal format for organizing various types of interaction related to one priority topic is the cluster format.

Theoretical and methodological approaches to the formation of cluster structures were presented in the works of Porter, Toffler, Marshall, etc. (Bakhshyan, 2019; Marshall, 2012; Porter & Michael, 2000).

The cluster approach is being actively implemented in various countries for the implementation and regulation of national innovative programs of socioeconomic development and is an effective technology for managing spatial development. This approach is successfully applied in the activities of universities, including pedagogical universities. In particular, the "Regional socio-pedagogical cluster" (RSPK), which is considered as a system for the formation of horizontal ties between the pedagogical university and municipal and regional organizations for the development of all levels of education and the system of continuous pedagogical education, has become a form of assembly of all practices of interaction between Minin University and Nizhny Novgorod region.

The regional socio-pedagogical cluster forms the educational ecosystem of the region, proceeding from the principles of consolidating the horizontal ties of partners and combining the resource base for solving the promising tasks of the national project "Education" and answering the challenges of our time.

The regulatory and legal basis for the creation and development of the RSPK was the agreement on cooperation between Minin University and the Ministry of Education, Science and Youth Policy of the Nizhny Novgorod Region, which describes the procedures for joint activities in the formation and implementation of state policy in the field of continuing education in pedagogical, psychological and pedagogical, sports and humanitarian directions.

The activities of the pedagogical university within the framework of the regional socio-pedagogical cluster are focused on three key areas, combining with the interests and needs of partners.

Firstly, the creation of a regional program of support and maintenance of the life cycle of the teaching profession in the logic of the continuity of teacher education.

Secondly, the provision of a systemic regional personnel policy in the field of education based on the calculation of the need for teaching staff (with a planning leverage of at least 10 years) and the formation of "teams of changes" with the involvement of graduates of various training profiles. The methodology for calculating the need for teaching staff involves the creation of a predictive planning system with a leverage of at least 10 years.

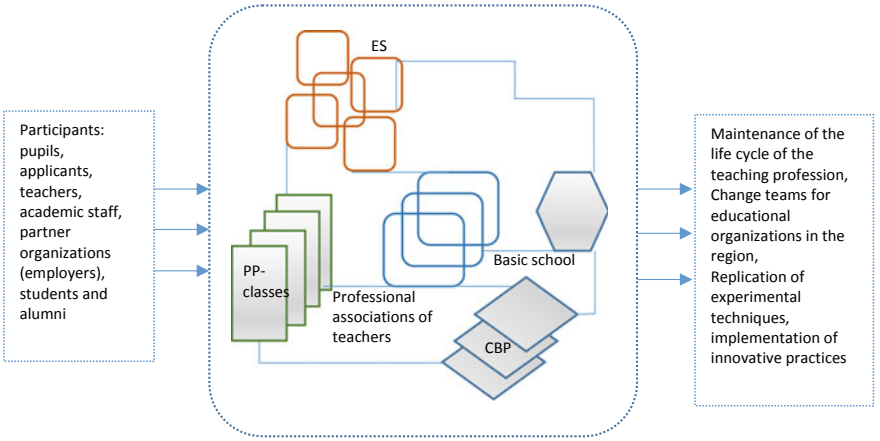

Fig. 14.1 The structure of the regional social and pedagogical cluster. *Source* Developed and compiled by the authors

And, thirdly, the development and experimental testing of the new content of teaching and upbringing, new pedagogical technologies, teaching and methodological, methodological, educational, and laboratory complexes within the framework of the current standards.

The formation of strong horizontal ties between the participants of the RSPK is carried out in the following formats of activity: professional associations of teachers, experimental sites, psychological and pedagogical classes, a basic school, clinical bases of practices (Fig. 14.1).

Regional professional associations of teachers are aimed at the formation of professional expert communities in the region, which are independent of the institutions represented and are able to perform the functions of public support and consultation, expertise, identification and dissemination of best pedagogical practices, representation, and protection of the interests of the professional community.

Experimental sites are focused on conducting pedagogical and psychological–pedagogical research, introducing and testing new practices in the educational process, involving teachers of educational organizations in research and innovative activities in education.

The activities of psychological and pedagogical classes are aimed at increasing the prestige of the teaching profession, identifying and attracting gifted applicants to the teaching profession, creating communication channels for pedagogically oriented applicants with university representatives and students. The prospect for the development of psychological and pedagogical classes is the formation of a virtual format of this activity, which will bring the interaction of the school and the university to a new level. The launch of a virtual psychological and pedagogical class will allow attracting an almost unlimited number of high school students to the teaching profession, regardless of their place of study.

The basic school of the pedagogical university is created to test, implement, and disseminate the best teaching, education, and development practices based on a new system of division of pedagogical labor and this is an educational complex, an innovative system of the knowledge and education industry, in which educational techniques and methods are constantly changing as the accumulation of information on their effectiveness.

The clinical bases of practices are focused on strengthening the connection between the student and the university teacher with the educational organization, mastering the basics of the teacher's professional skill, interaction, and cooperation with colleagues in the teaching staff in activities and through activities.

The cluster approach implemented by the university provides a comprehensive solution to humanitarian and social problems at the regional level, which, in turn, contributes to the growth of the quality of all types of university activities, and also ensures the growth of the university's reputation.

14.3 Results

The formation and development of the regional socio-pedagogical cluster necessitated changes in various aspects of the organizational and management activities of the university: regulatory support: the university assumes the function of coordinating the activities of all participants, their normative consolidation, and ensuring transparency of activities based on legislative norms and regulations; organizational support: the university is the coordinator between the educational organizations of the region, ensuring their communication, creating a platform for the exchange of experience, both in real space and in virtual space; personnel and financial and economic support: the active position of the pedagogical university, which presupposes the presence of a flexible system of motivation for scientific and pedagogical workers and researchers, is a condition for the effective development of the RSPK. Indicators of the effectiveness of the activities of scientific and pedagogical workers within the framework of the RSPK are included in the effective contract of scientific and pedagogical workers and they are criteria for assessing the activities of scientific and pedagogical workers of the university. In particular, these are the following indicators: "availability of management of the activities of an experimental or regional innovation platform"; "conducting seminars, conferences, masterclasses, webinars, and other events together with partners"; "participation or leadership in the activities of a regional association of educators"; "conducting classes in a psychological and pedagogical class".

Analysis of the dynamics of performance indicators of scientific and pedagogical workers within the RSPK of Minin University shows that the dynamic development of the RSPK requires systematic participation of about 40% of the total number of scientific and pedagogical workers of the university.

The effectiveness of activities within the RSPK for the period is characterized by the following indicators (Fig. 14.2): growth in the average USE score of applicants (by

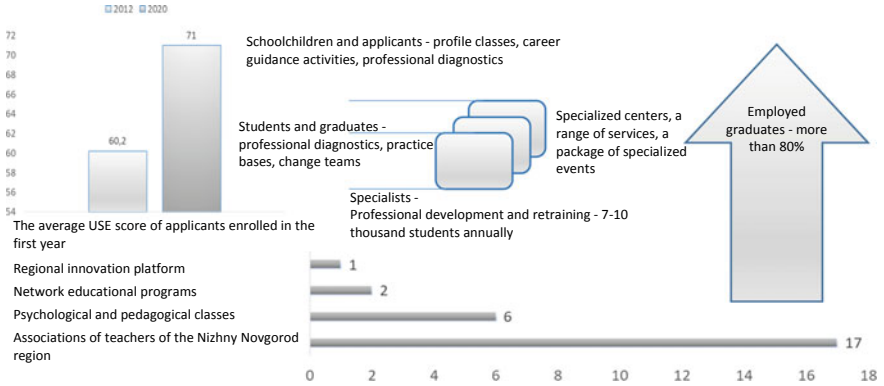

Fig. 14.2 Effects on the results of activities within the RSPK. *Source* Developed and compiled by the authors

more than 10 points over the period); the formation of a system of advanced training for teachers based on the principles of continuous teacher education in the region; development of the social agenda of the university, its inclusion in the processes of social development of the region as an expert element and a real agent of change; constant updating of mechanisms for the development of social partnership; increase in the efficiency of educational organizations in the region, the emergence of developments at the federal level, the implementation of priority development indicators; high percentage of employment of university graduates, securing them in educational institutions of the region (more than 80%).

14.4 Conclusion

The cluster format of the interaction of Minin University with the structures and the public of the region is quite effective. It is planned to create a single electronic platform that unites all participants in the cluster's activities in a single information space and provides methodological support for educational activities in order to increase the efficiency of the RSPK in the near future. The platform will be formed in accordance with the principles of social networks and will allow to differentiate participants on various grounds: role in the RSPK system, functions performed, status, etc. The RSPK electronic platform will provide opportunities for the formation of various groups and project teams for joint activities, ensure constant work and create conditions for regular updating of information. At the same time, the development of the cluster is associated with a number of problems associated with a shortage of resources (material, technical, technological, personnel, temporary), with interdepartmental disunity, with additional obligations of participating organizations. Effective and timely solution to the above problems is the key to the successful development of the regional socio-pedagogical cluster of Minin University.

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Chapter 15
Development of the Educational Organization in the Period of Changes

Olga A. Medvedeva, Asya E. Arutyunova, Irina G. Sukhanova, Nadezhda V. Pilipchuk, and Anna F. Beilina

JEL Codes G32 · M19 · O43 · Y1

15.1 Introduction

The changes taking place in the world, associated with widespread digitalization and automation, lead to a change in the usual way of life of people and the transformation of business processes. They are based on a new understanding of human capital and its role in ensuring social progress. The emerging high-tech network environment not only opens up new opportunities for the organization of work, but it also creates a demand for labor with a higher level of qualification, which extends to all professional groups (Frey & Osborne, 2013; Kenney & Zysman, 2016). A modern employee should have not only an expanded range of professional competencies but also systematic and creative skills, skills of working with large amounts of information, as well as digital literacy (Kapustina et al., 2020; Karpunina et al., 2019; Rukina et al., 2019; Sagina et al., 2020). In such conditions, a special role is assigned to the

O. A. Medvedeva (✉)
G.R. Derzhavin Tambov State University, Tambov, Russia

A. E. Arutyunova
Kuban State Technological University, Krasnodar, Russia

I. G. Sukhanova
Moscow University for Industry and Finance "Synergy", Moscow, Russia
e-mail: ocenka77@list.ru

N. V. Pilipchuk
Tver State University, Tver, Russia

A. F. Beilina
Voronezh State Pedagogical University, Voronezh, Russia

E. G. Popkova and B. S. Sergi (eds.), *Digital Education in Russia and Central Asia*,
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higher education system, which provides training of personnel with the required qualifications. Universities as structural units of the higher education system should adapt to the new conditions as soon as possible, restructure the principles of working with students, introduce advanced methods of organizing the learning process, and find sources of funding for innovation (Konovalova et al., 2020). However, in order to fulfill the tasks assigned to the higher education system, each university must strive to be effective in educational, scientific, and other activities. Detailed study of various aspects of their activities, identification of strengths and weaknesses, search for ways to increase their extra-budgetary income, and commercialization of research results are urgent tasks for modern universities (Kasyanov et al., 2017). A practical tool for achieving them can be a comprehensive analysis of the activities of an educational organization.

15.2 Theoretical Basis of the Study

Kasyanov et al. (2017), Konovalova et al. (2020), Dneprovskaya (2018) emphasize the increasing burden on the higher education system as an institution that ensures digital transformation. Uvarov and Frumin (2019) point to the functionality of universities in the process of forming new skills and competencies of modern specialists, as well as maintaining interest in learning. Endovitsky and Krivosheev (2020), Kostyukova (2018), Yazovskikh (2017) are actively engaged in studying the activities of Russian higher education organizations. Barbashova and Sudakova (2018), Meliksetyan (2016), Rukina et al. (2019), Dolgov and Shchekoldin (2017), Davydova and Zakharova (2018), Chinenov and Semibratov (2018), Balabanov (2019), Arlashkin (2014), Ekimova et al. (2018), Gorislavskaya and Derbeneva (2019), Gurunyan (2017) focus on the study of approaches to the organization of the process of financing the activities of higher education institutions in Russia. However, during the period of changes, it is necessary to conduct a comprehensive analysis of the activities of the organization of higher education, which allows us to determine the prospects for its further development and to form specific mechanisms for achieving them. However, at present, such an analytical tool is not available in the practice of Russian universities.

15.3 Methodology

The purpose of the study is to determine the directions of development of the higher education organization in the period of changes and to form a mechanism for their practical implementation based on a comprehensive analysis of the activities of the educational organization.

Research objectives: (1) formation of methodology for conducting a comprehensive analysis of the financial and economic activities of the university; (2) creation of

SWOT and STEP analysis matrices as a basis for developing measures for the development of the organization; (3) development of a mechanism for the development of an educational organization in the main areas of activity.

Research methods: abstract-logical method, analysis of dynamics series, calculation of average values and relative indicators, methods of tabular and graphical representation of information; systematization, comparison, method of expert assessments.

15.4 Results

At the first stage of the study, the authors developed a methodology for a comprehensive analysis of the financial and economic activities of higher education organizations (Fig. 15.1).

This method is tested on the example of G.R. Derzhavin Tambov State University. The asset structure of the balance sheet of G.R. Derzhavin Tambov State University is shown in Fig. 15.2 as a Pareto diagram (Eisenberg and Yuzhakov, 1979).

The largest share in the asset balance of the educational organization is occupied by nonproductive assets and fixed assets—more than 30%, accounts receivable for payments is 21%. The remaining items of the asset have a negligible weight in the range from 0.1 to 7.1%.

The structure of the educational organization's balance sheet liability is shown in Fig. 15.3 in the form of a cascade diagram (Monitoring.miccedu, 2019; Zhuklinets, 2018).

The largest share in the liability of the educational organization's balance sheet belongs to the volume of settlements with the founder (97.3%). This is typical of

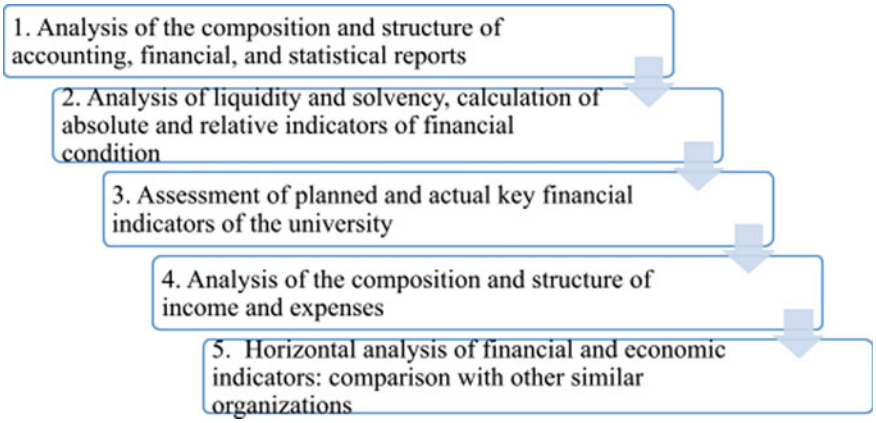

Fig. 15.1 Methodology for conducting a comprehensive economic analysis of the financial and economic activities of a higher education organization. *Source* Compiled by the authors

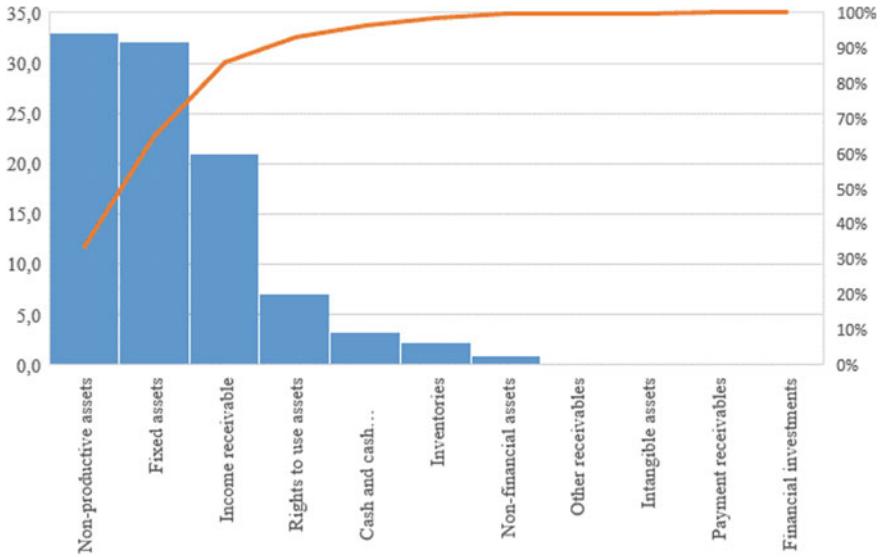

Fig. 15.2 Asset structure of the balance sheet of G.R. Derzhavin Tambov State University as of 01.01.2020, %. *Source* Compiled by the authors based on G.R. Derzhavin Tambov State University (2021a)

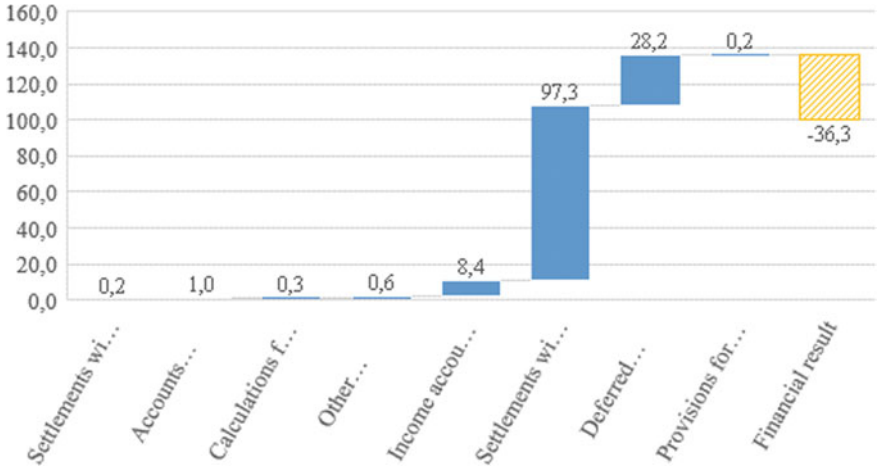

Fig. 15.3 Structure of the liability of the balance sheet of the G.R. Derzhavin Tambov State University as of 01.01.2020, %. *Source* Compiled by the authors based on G.R. Derzhavin Tambov State University (2021a)

Table 15.1 Estimated indicators of the financial condition of G.R. Derzhavin Tambov State University as of 01.01.2020, thousand rubles

№	Indicator	01.01.2020	01.01.2019	Absolute deviation, thousand rubles
1	**Nonfinancial assets, total**	**1,953,397,4**	**1,582,757,4**	**370,640**
	of these: fixed assets, total	2,216,949,7	2,160,075,5	56,874,2
	including: residual value	830,996,1	818,305,8	12,690,3
2	**Financial assets, total**	**638,190,1**	**73,011,3**	**565,178,8**
	of these: income receivables	544,143,3	7,285,2	536,858,1
	expense accounts receivable	2,201,1	1,546,8	654,3
3	**Income from the provision of services on a paid basis**	**1,028,447,2**	**968,208,1**	**60,239,1**
4	**Amount of budget allocations**	**391,945,6**	**380,878,8**	**11,066,8**
5	**Total revenue**	**1,599,138,1**	**1,524,287,9**	**74,850,2**

Source Compiled by the authors based on G.R. Derzhavin Tambov State University (2021a, 2021b)

budget organizations since they receive most of their financial support from the country's budget (Balabanov, 2019). The authors analyzed the financial condition of the educational organization (Voronchenko, 2016; Sviridova et al., 2017) (Table 15.1).

All indicators for 2019 increased. The volume of financial assets rose to a greater extent—by 565,178. 8 thousand rubles. This was due to an up-growth in income receivables. At the same time, the institution's income grew (by 60,239.1 thousand rubles) and budget allocations (by 11,066.8 thousand rubles). Due to this, the total income of the educational organization also raised (Arlashkin, 2014; Uvarov & Frumin, 2019; Vasilyeva & Andreeva, 2018). The authors analyzed the relative indicators of the financial condition of the G.R. Derzhavin Tambov State University (Table 15.2).

In 2019, the share of budget financing in G.R. Derzhavin Tambov State University decreased by 0.5%, although it increased in absolute terms. The decline was due to a faster growth rate of income from income-generating activities. The share of property financed from budget sources has significantly decreased—by 7.9%. This is due to the increase in the property of the budget organization by 56.5%. However, the self-financing ratio has raised (by 0.082), which shows how much of the organization's income is accounted for by each ruble of budget financing. In G.R. Derzhavin Tambov State University, on average, this figure is about 2.6 rubles. In the educational organization during the study period, the coefficient of the asset structure increased, that is, for every ruble of nonfinancial assets on 01.01.2020, 0.3 rubles of financial assets are accounted for (this is 7.1 times more than on 01.01.2019) (Balabanov, 2019; Spitz, 2004). Deviations of the actual income received from the planned ones are insignificant. The maximum deviation was in 2020, it was 1,699.6 thousand rubles (0.17%), and the minimum deviation of 55 thousand rubles was achieved in 2019 (0.005%). Following the standard, these deviations are considered insignificant, since they are

Table 15.2 Relative indicators of the financial condition of G.R. Derzhavin Tambov State University at the beginning and end of 2019

Indicator	Formula	01.01.2020	01.01.2019	Change
Self-financing Ratio	Income from income-generating activities/budget allocation	2.624	2.542	0.082
Asset structure ratio	Financial assets/nonfinancial assets	0.327	0.046	0.281
Financial independence ratio	Income from the provision of services on a paid basis/Total revenue	0.643	0.635	0.008
The ratio of the availability of nonfinancial assets with long-term sources of financing	Group of liabilities P4/Nonfinancial assets	1.186	0.991	0.195
Share of budget financing,%	The ratio of budget funds to total revenue	24.5	25.0	−0.5
The share of the organization's property financed from budget sources in the total amount of property, %	The ratio of the amount of budget funds to the total value of the property	15.1	23.0	−7.9
Indicators of the state of fixed assets				
Depreciation rate	Amortization/Initial cost	0.625	0.621	0.004
Shelf life factor	Residual value/Initial cost	0.375	0.379	−0.004

Source Compiled by the authors based on G.R. Derzhavin Tambov State University (2021a, 2021b)

less than 10% (Meliksetyan, 2016). On average, for 5 years, the deviation of the actual income received from the planned ones amounted to 696.56 thousand rubles (0.085%) (Chinenov & Semibratov, 2018). Since 2016, all components of income (except for subsidies for state tasks) have increased, and during the same period, the educational organization has received grant funding. The income structure of G.R. Derzhavin Tambov State University has not changed over the past 5 years (Fig. 15.4).

Since 2015, the cost of staff payments and the purchase of goods works, and services has been steadily increasing, while the cost of scholarships has been gradually reduced. In 2016, the university began spending on capital investments in state-owned objects, which have been decreasing since 2017 (Fig. 15.5).

Tambov State University named after G.R. Derzhavin is among the top 50 universities, ranking 23rd in terms of "share of income from extra-budgetary sources". In an educational organization, this indicator is 61.5%, which is high for a budget organization. This indicates financial stability and independence (Fig. 15.6).

However, in terms of total income per 1 research and teaching employee, G.R. Derzhavin Tambov State University occupies the 196th position among the studied universities in Russia (2,517.1 thousand rubles). This is significantly less than the median value (2,863.8 thousand rubles) and indicates that other universities have

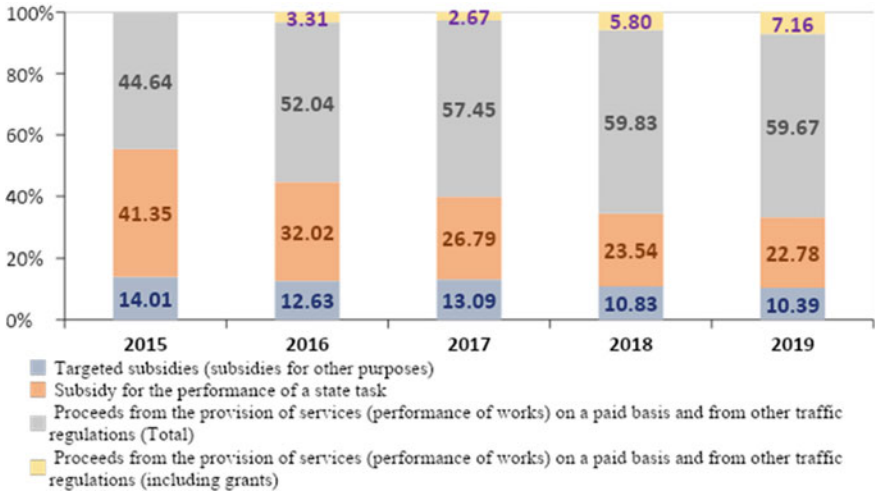

Fig. 15.4 Structure of income of G.R. Derzhavin Tambov State University by sources of financing, 2015–2019, %. *Source* Compiled by the authors based on G.R. Derzhavin Tambov State University (2021c)

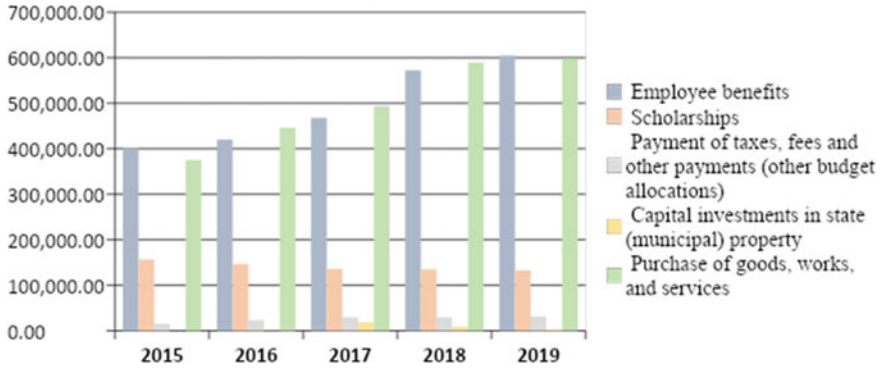

Fig. 15.5 Composition of expenses of G.R. Derzhavin Tambov State University, thousand rubles, 2015–2019. *Source* Compiled by the authors based on G.R. Derzhavin Tambov State University (2021c)

managed to maximize their income. The success of any organization depends on how it responds to external events during a period of change, how it deals with internal weaknesses, and uses its strengths. SWOT and STEP analysis allow the authors to analyze such capabilities of the organization (Table 15.3).

Thus, among the strengths of the educational organization, the following can be distinguished: a high proportion of foreign students; extensive material and technical base of the university (9 academic buildings and 4 dormitories); developed sports and sociocultural infrastructure; high coverage of full-time students in the region

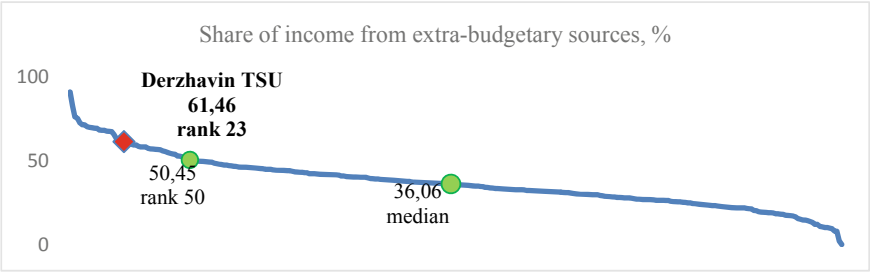

Fig. 15.6 The share of income from non-budgetary sources of Russian universities in 2018, located from the largest to the smallest, thousand rubles. *Source* Compiled by the authors based on Meliksetyan (2016)

(more than 50%). The weaknesses of the educational organization are low citation rate; low publication activity; unbalanced use of the campus; an excessive number of non-targeted activities and fragmentation between the areas of work with young people.

The authors conducted a STEP analysis to assess the impact of market and consumer trends on the activities of G.R. Derzhavin Tambov State University (Table 15.4).

Technological factors have the greatest impact on the activities of G.R. Derzhavin Tambov State University, and economic factors have the least impact. Indeed, the financial condition of the university is quite stable, so the influence of economic factors is not so high. The educational organization should pay attention to the technological environment, to the development of its information technologies, including in education, as well as to the digitalization of business processes. The data from the analysis of financial and economic activities, as well as SWOT and STEP analysis, allowed the authors to identify strategic directions and develop measures for the development of G.R. Derzhavin Tambov State University during the period of changes in the main areas (education, science, infrastructure, and youth policy) (Table 15.5).

15.5 Conclusions

The authors proposed a mechanism for conducting a comprehensive analysis of the activities of the organization of higher education and determining the directions of its development during the period of changes. The authors proposed a methodology for conducting a comprehensive analysis of the financial and economic activities of an educational organization. The main stages of the analysis are analysis of the composition and structure of accounting, financial, and statistical reports; analysis of liquidity and solvency, calculation of absolute and relative indicators of financial condition; assessment of planned and actual key financial indicators of the university;

Table 15.3 Weighted score of strengths and weaknesses of G.R. Derzhavin Tambov State University in the framework of SWOT analysis

Strengths	Significance	Influence	Weighted score	Rating (total)
More than 50% of the total number of full-time students in the region study at TSU	4	4	16	0.12
Coverage of almost 100% of the region's students in enlarged groups of training areas: health and medical sciences, humanities, mathematics, and natural sciences	5	3	15	0.11
High proportion of foreign students in the total number of students	5	5	25	0.18
Expanding partnerships with leading scientific and educational organizations in Russia and the world	3	5	15	0.11
Participation in the Scientific and Educational Center "Innovative solutions in agriculture"	3	3	9	0.07
The leader in the region in terms of the number of grants won and implemented in the Russian Science Foundation, the Russian Foundation for Basic Research, and regional research grants	2	3	6	0.04
The University has 9 academic buildings and 4 dormitories and rents an additional 3 dormitory buildings	5	5	25	0.18
Developed sports and sociocultural infrastructure	5	4	20	0.15
The university has more than 65 different student associations	3	2	6	0.04
Total			**137**	**1**
Weaknesses				
Part of the university's partnership is fixed only on paper	1	1	1	0.01
Low level of foreign language proficiency among employees	3	4	12	0.10
Low citation rate of research and teaching staff	5	5	25	0.22
Low level of publication activity of research and teaching staff	4	5	20	0.17

(continued)

Table 15.3 (continued)

Strengths	Significance	Influence	Weighted score	Rating (total)
Few studies are commissioned by businesses	2	3	6	0.05
Difficulties in managing a large campus	2	4	8	0.07
Unbalanced use of the campus	4	4	16	0.14
Difficulties for students in the combination of academic and extracurricular activities	3	3	9	0.08
Excessive number of non-targeted extracurricular activities	4	4	16	0.14
Consumer attitude of students to the university	1	2	2	0.02
Total			**115**	**1**

Source Compiled by the authors according to a survey of experts from among the leading scientists of G.R. Derzhavin Tambov State University in the field of economics and management

Table 15.4 Summary table of STEP-analysis of G.R. Derzhavin Tambov State University, taking into account the assessment of the influence of factors

Factors of influence of the political environment	Evaluation	Factors of influence of the economic environment	Evaluation
Control and supervisory measures in the field of education	0.44	Decline in real incomes of the population	0.35
Trend toward integration and unification of universities	0.41	The narrowing of the global economic space due to the policy of import substitution	0.18
Increase in taxes/benefits	0.14	Increasing the share of the commercial sector in the economy	0.11
Bureaucratization	0.10	Rising unemployment rate	0.06
Factors of influence of the sociocultural environment	**Evaluation**	**Factors of influence of the technological environment**	**Evaluation**
High population migration, especially at a young age	0.44	Automation and digitalization of business processes	0.44
Population's preferences for secondary vocational education	0.38	Development of distance education	0.38
Decline in the region's population	0.24	Rapid development of information technology	0.29
Unrest and distancing preference in connection with the pandemic	0.07	Lack of development of legislation in the field of the digital economy	0.11

Source Compiled by the authors based on the expert assessment of the probability of changes in the STEP-analysis factors and their impact on the work of Tambov State University

Table 15.5 Measures to implement the development concept of G.R. Derzhavin Tambov State University

Development areas	Measures
Education	
Working with applicants, attracting talented students	1. Year-round targeted advertising in popular social networks, aimed at the target audience-students of grades 9–11 and their parents 2. Annual monitoring of the university's marketing campaign to assess the effectiveness of the online campaign and offline events
Working with foreign students	(1) The inclusion of a new type of adaptation of foreign students: the assignment to each foreign student of an individual supervisor from among the Russian students or young employees of G.R. Derzhavin Tambov State University. The formation of such pairs should be based on preliminary testing for the coincidence of interests and hobbies, personality type and temperament, etc (2) Active participation of foreign students in extracurricular activities on an equal basis with Russian students
Revision of educational programs	(1) Modernization of educational programs to meet the requirements of employers implies periodic consultations of employers on specialized disciplines, as well as inviting specialists from the real sector of the economy for point-based training on specific topics (2) The inclusion of new educational technologies in the programs (for example, online courses, ted lectures, webinars, igropractics)

(continued)

Table 15.5 (continued)

Development areas	Measures
Science	
Increasing the citation and publication activity of the teaching staff	Introduction of an effective contract for researchers, consisting of a salary and a variable part. It is proposed to include 3 sections in the variable part of an effective contract for researchers: * research activity (indicators of the number of publications in Scopus and Web of Science; indicators of citation of these publications); * increase of human resources potential (defense of a dissertation for obtaining a scientific degree on time, management of the defense of the dissertation); * research work with students (participation of students in competitions of research works of different levels)
Increasing the commercial impact of scientific research	Increasing the commercial impact of research activities requires the formation of a sales department (Romanova and Kolesnik, 2019). Its functions should include: – market research and preferences, search for competitive technologies (products, products, etc.); – product study—the results of research activities, the interest for the consumer, as well as the possibility of its commercialization; – search for possible buyers, sales, and post-sales support (Makhotlova, 2011)
Infrastructure	
Introduction of lean technologies	(1) Diagnostics of the organization to identify problems or opportunities; (2) Creating a draft version of the solution that covers all employees and students; (3) Implementation of proposals for the implementation of projects for the introduction of lean technologies; (4) Continuous monitoring of the results of the completion of lean projects

(continued)

Table 15.5 (continued)

Development areas	Measures
Improving campus management	Implementation of the configuration of the program "1C: University prof. University Campus Management". It includes accounting for the fund of premises, planning the structure of dormitories and other large infrastructure facilities, accounting for the characteristics of campus facilities, entering event information about facilities (equipment failure, repairs), accounting for costs for each campus facility
Youth policy	
Systematization of extracurricular activities	Tracking the effectiveness of cultural and sports events of the university and the reasonableness of costs with the help of the program "1C: Document Management of a state institution"
Formation of the university's communication strategy in terms of working with young people	Review of all the information sources of the university, the choice of one main one (for example, a website or a VKontakte group), systematization of all the media available in the university, and subsequent control of their work

Source Compiled by the authors based on a comprehensive economic analysis of the university's activities, as well as SWOT and STEP analysis

analysis of the composition and structure of income and expenses; horizontal analysis of financial and economic indicators. The authors formed SWOT and STEP analysis matrices for the development of measures for the development of the organization. A SWOT analysis of the activities of TSU named after G.R. Derzhavin allowed us to identify the main opportunities of the organization, as well as threats. The STEP analysis showed that technological factors have the greatest impact on the university's activities, while economic factors have the least impact. An educational organization should pay attention to the technological environment, to the development of its information technologies, including in education, as well as to the digitalization of business processes. The results of a comprehensive analysis of the organization's activities allowed the authors to determine the directions of its long-term development in the main areas of activity: education, science, infrastructure, youth policy.

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Chapter 16
Diagnostics of the Educational Potential of Regions as a Way to Ensure the Economic Security of the Russian Federation in the Context of Digitalization

Nadezhda I. Yashina, Oksana I. Kashina, Nataliya N. Pronchatova-Rubtsova, Sergei N. Yashin, and Victor P. Kuznetsov

JEL Codes H61 · H7 · I22 · I23

16.1 Introduction

Investments in human capital and education are of great importance for the development of the economy in Russia. To compare social development, there is a human development index whose main components are longevity, education, and per capita GDP. Education determines a country with a high or no level of human development.

It is important to understand that a significant share of the growth in GDP gives an intellectual component. With the development of information technologies and the education system, digitalization is becoming an integral part of it. Very high demands are made by employers for the labor qualities of students, complex tasks are set for the field of education, and employment of young people. An important role is given to the modernization and development of the education system since the growth of specialists with higher education is characteristic of countries with developed markets and a high share of intangible products in GDP (Charles & Zegarra, 2014; Charnes et al., 1978; Domenech et al., 2016; Saisana et al., 2005; Schultz, 1961).

The methodology for assessing the educational potential of regions for the economic security of Russia is an actual issue on the condition of financial instability.

N. I. Yashina (✉) · O. I. Kashina · N. N. Pronchatova-Rubtsova · S. N. Yashin
Lobachevsky Nizhny Novgorod State University, Nizhny Novgorod, Russia

V. P. Kuznetsov
Minin Nizhny Novgorod State Pedagogical University, Nizhny Novgorod, Russia

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The differentiation of human potential in different regions cannot but affect the quality, resource provision of the education system that influences the socioeconomic state of the regions and the possibility of effective economic growth (Chigarin, 2015; Porunov, 2017).

16.2 Methodology

The methodological basis of the study was made up of economic and static methods, a systematic approach, and a method of optimal solutions. The methodology was tested using official data from the Federal State Statistics Service and the Ministry of Finance of Russia for 2018–2019.

At the first stage, quantitative indicators were selected (Becker, 1994; Charnes et al., 1994; Chigarin, 2015; James, 2015; Kornilov et al., 2019; Porunov, 2017). Their analysis allowed us to draw some qualitative conclusions about the educational potential based on operational network indicators, indicators of regional digitalization, the financial and economic situation of the regions.

The second stage represents the analytical processing of the collected data and the formation of a system of indicators. The educational potential of the regions is assessed in terms of the following indicators: operational-network indicators of education; indicators of regional digitalization and the financial-economic situation of the regions. Tables 16.1, 16.2 and 16.3 describe in detail the indicated groups of indicators.

The group of operational-network indicators of the regional educational potential is united by the integral indicator of the presence of a developed education system for the country. This integral component is used in the preparation of the rating of educational potential as a guide. The presence of universities in the regions leads to an increase in the percentage of young people with higher education.

Indicators of the number of students enrolled in bachelor's, specialist's, master's programs (thousand people), admission to bachelor's, specialist's, master's programs (thousand people), graduation of bachelors, masters (thousand people), a material and technical provision in educational institutions, training of highly qualified personnel, their employment, involvement in the labor market, involvement in science (for inventions, for utility models) are important not only as a benchmark for the country's education but also its quality component.

Integral index of regional digitalization factors characterizes the development of technologies, the use of information technologies (PCs, servers), and utilization rates of network security (organizational use of the Internet, including broadband access).

A group of economic and financial indicators of the region includes the average monthly nominal wage of employees of organizations (RUR), the coefficients of production capacity, the cost of innovation, the scope of innovation, investment development, investment allocation, regional income, the ratio of the consolidated revenues and gross regional product, the ratio of costs of subjects of consolidated budgets Russia and the GRP, the ratio of costs and revenues of the consolidated

Table 16.1 Group of operational-network indicators of the educational potential in regions

Designation	Name of indicator	Interpretation and calculation
KOPR1	Number of students enrolled in bachelor's, specialist's, master's programs (thousand people)	The higher the index value, the better the quality of life in the region
KOPR2	Admission to study under bachelor's, specialist's, master's programs (thousand people)	The higher the index value, the better the quality of life and level of education in the region
KOPR3	Graduation of bachelors, masters (thousand people)	The higher the index value, the better the quality of life and level of education in the region
KOPR4	Coefficient of material and technical security in educational institutions	The higher the index value, the better the logistics and equipment in regional training institutions, which also contributes to the development of regional education Number of personal computers used for teaching purposes in public municipal organizations/1000 enrolled students
KOPR5	Higher qualification training factor	A high score reflects the development of the regional education system Number of organizations that train specialists/Number of organizations that train specialists in the Russian Federation
KOPR6	Employment rate	The higher the indicator, the better the education system and labor market in the region Composition of the employed population by education level in the region/Composition of the employed population by education level in the Russian Federation
KOPR7	Coefficient of involvement in the labor market	A high score reflects a large degree of involvement of the regional population in a labor market, which also affects the standard of living and economy of the region as a whole Average annual employment in the region/Average annual employment in the Russian Federation
KOPR 8, KOPR 9	Engagement rate in science (on inventions and utility models)	The higher the indicator, the higher level of population involvement in science and innovation Admission of patent applications in the region/Admission of patent applications in Russia

Source Compiled by the authors

Table 16.2 Group of indicators of regional digitalization

Designation	Name of indicator	Interpretation and calculation
PC1	Coefficient of technology development	The higher the indicator, the higher level of the development of the productive and innovative potential in the region Develop advanced manufacturing technologies in the region/developed advanced production technology in Russia
PC2	Technology utilization rate	The higher the indicator, the higher level of development of the productive and innovative potential in the region Used advanced production technologies in the region/Used advanced production technologies in the region in the Russian Federation
PC3, PC4	The coefficient of information technologies (PCs, servers)	The indicator reflects the level of information and communication technology in providing regional organizations
PC5, the PC6	The utilization rate of network security (Organization, use the Internet, including broadband access)	The value of this indicator characterizes the level of network usage and security in the region

Source Compiled by the authors

budgets of the RF subjects, the growth of industrial production, and production by economic activity. The regional economies are aimed at innovative development, so it is important for creating innovative products.

The third stage involves the calibration coefficients into groups.

To transform coefficients to a common measurement interval, it is necessary to make its calibration, based on the performance requirements (minimize or maximize) (Porunov, 2017). The following formulas are used for calibration while minimizing indicators (16.1) and calibration for maximizing indicators (16.2).

$$K_{ij}^{*} = \frac{K_{ij} - K_{imin}}{K_{imax} - K_{imin}}, \tag{16.1}$$

$$K_{ij}^{*} = \frac{K_{imax} - K_{ij}}{K_{imax} - K_{imin}}, \tag{16.2}$$

where K_{ij}^{*}—a calibrated indicator ith the proposed index for the diagnosis of the educational potential of the regions in jth region, K_{ij}—estimated value ith proposed educational potential diagnostic indicator regions jth region, K_{imax}—the highest calculated value ith index among the analyzed RF subjects, K_{imin}—the smallest calculated value ith index among the analyzed RF subjects. This method

Table 16.3 Group economic and financial indicators in the region

Designation	Name of indicator	Interpretation and calculation
PEF1	Average monthly nominal accrued wages of employees (rubles)	The higher the index, the higher level of population wealth in the Russian Federation and its regions
PEF2	The coefficient of production capacity	The higher the index, the higher level of production capacity in the region Fixed assets in the economy/GRP
PEF3	Innovation Cost Ratio	The higher the indicator, the higher the developed production and innovation potential The cost of technological innovation/GRP
PEF4	Innovation volume ratio	The higher the indicator, the higher the developed production and innovation potential The volume of innovative goods, works, services/GRP
PEF5	Investment development ratio	A large value of the index indicates a high level of economic development of the country and individual subjects of the Federation
PEF6	Investment distribution ratio	The value of this indicator characterizes the level of regional investment and reflects the share of funding sources in the Russian Federation and its regions
PEF7	Investment development ratio	The higher the value, the greater the share of costs for construction and technological renovation of the economy of Russia and its regions Investments in fixed capital by type of economic activity total (million)/GDP
PEF8	Factor of regional income	A high score reflects the level of development of the regional economy Consolidated budgets' incomes of the Russian regions/Consolidated budget incomes of Russia
PEF9	Coefficient of consolidated revenues in the GRP	The higher the index, the higher the level of development of the economy in Russia and its regions Revenues of the consolidated budgets of the Russian Federation/GRP

(continued)

Table 16.3 (continued)

Designation	Name of indicator	Interpretation and calculation
PEF10	The ratio of consolidated budgets' expenditures of the Russian regions to GRP	A high score reflects the large share of the implementation of national projects costs of government programs that contribute to stimulate economic growth and improve people's quality of life Consolidated budgets' expenditures of the Russian regions/GRP
PEF11	The ratio of consolidated budgets' expenditures of the Russian regions on the national economy to consolidated budget revenues	This indicator defines the ratio of costs and revenues of the consolidated budget of the Russian Federation, which also reflects the economic condition of Russia and its regions Consolidated budgets' expenditures of the Russian regions on the national economy/Consolidated budget revenues
PEF12	The coefficient of performance of budgets of the Russian Federation in relation to GRP	Indicator reflects the level of mobilization and use of budget funds Execution of the RF budget (pension fund, social security fund, the compulsory health insurance fund) /GRP)
PEF13	Industrial growth factor	The higher the index, the higher level of industrial growth in the region
PEF14	Production growth rate by type of economic activity (manufacturing activity)	The higher the index, the higher level of manufacturing activity in the region

Source Compiled by the authors

of calibration leads to a change in the values of the indicators in the range from 0 to 1.

In the fourth stage, the group summarizes the calibrated parameters in order to determine the cumulative coefficient of the calibrated complex (SKKK). The region with the minimum number of points is in the first place.

16.3 Results

The empirical results of the research are illustrated in Table 16.4.

All regions, based on the value of the calibrated indicator of the educational potential of the regions, were divided into three groups: first group—"leading regions"; second group—"mixed regions"; third group—"outsider regions".

Table 16.4 The regional educational potential system of indicators of the condition of digitalization, 2018 (fragment)

Region	Complex calibrated coefficients of the group of network operational performance of the educational potential of the regions		Complex calibrated coefficients of the regional digitalization group		Complex factors calibrated group of economic and financial indicators of the region		Aggregate complex calibrated coefficients		Place
	KKK KOPR	Rank	KKK PC	Rank	KKK PEF	Rank	SKKK	Rank	
Russian Federation	1.512	1	1.132	1	16.830	26	19.474	28	1
Moscow city	2.143	3	1.962	6	16.434	21	20.538	30	2
Leningrad Region	2.396	7	2.499	15	16.118	13	21.013	35	3
Altai Territory	2.771	21	1.923	5	16.125	14	20.819	40	4
Republic of Tatarstan	2.965	27	2.244	12	15.807	8	21.016	47	5
Magadan Region	3.019	28	1.993	7	16.227	18	21.239	53	6
St. Petersburg city	3.367	31	2.240	11	16.078	12	21.685	54	7
Amur Region	2.692	19	2.606	18	16.246	19	21.544	56	8
First level	**2.813**	**24**	**2.868**	**32**	**13.462**	**1**	**19.143**	**57**	**9**
Moscow Region	3.382	32	2.769	26	14.145	3	20.296	61	10
Nizhny Novgorod Region	3.437	41	2.683	20	14.921	4	21.042	65	11
Jewish Autonomous Region	2.285	4	3.395	68	15.816	9	21.495	81	12
Murmansk region	3.561	63	2.066	8	15.970	10	21.597	81	13
Republic of Adygeya	2.790	22	2.196	10	17.579	51	22.565	83	14
Komi Republic	2.471	9	3.228	61	16.151	15	21.850	85	15

(continued)

Table 16.4 (continued)

Region	Complex calibrated coefficients of the group of network operational performance of the educational potential of the regions		Complex calibrated coefficients of the regional digitalization group		Complex factors calibrated group of economic and financial indicators of the region		Aggregate complex calibrated coefficients		Place
	KKK KOPR	Rank	KKK PC	Rank	KKK PEF	Rank	SKKK	Rank	
Khabarovsk Territory	3.455	42	2.824	28	16.171	17	22.450	87	16
Republic of Ingushetia	3.942	85	1.687	3	13.838	2	19.467	90	17
…									
Second level	**3.435**	**38**	**3.143**	**55**	**17.354**	**41**	**23.932**	**134**	**41**
Kemerovo region	2.509	11	3.322	66	17.754	58	23.584	135	42
Pskov region	2.612	17	3.032	49	18.184	70	23.827	136	43
Tver region	3.414	36	3.382	67	17.054	33	23.850	136	44
Kurgan region	2.506	10	4.112	84	17.378	43	23.996	137	45
Sevastopol city	3.761	83	3.030	48	15.795	7	22.586	138	46
Tyumen region	2.361	6	3.117	52	19.887	83	25.364	141	47
Irkutsk region	2.600	14	3.626	78	17.554	50	23.780	142	48
…									
Chechen Republic	3.987	86	3.413	69	15.481	5	22.881	160	65
Tomsk Region	3.481	50	3.763	80	16.986	30	24.231	160	66
Orel Region	2.714	20	3.454	71	18.193	71	24.361	162	67
…									
Third level	**3.621**	**70**	**3.276**	**63**	**20.551**	**86**	**27.448**	**219**	**82**
Saratov Region	3.703	81	3.730	79	17.865	63	25.298	223	83

(continued)

Table 16.4 (continued)

Region	Complex calibrated coefficients of the group of network operational performance of the educational potential of the regions		Complex calibrated coefficients of the regional digitalization group		Complex factors calibrated group of economic and financial indicators of the region		Aggregate complex calibrated coefficients		Place
	KKK KOPR	Rank	KKK PC	Rank	KKK PEF	Rank	SKKK	Rank	
Republic of Mari El	3.699	80	3.609	76	18.230	74	25.537	230	84
Republic of Kalmykia	3.640	72	4.052	83	18.374	75	26.066	230	85
The Republic of Daghestan	3.769	84	5.994	86	18.825	79	28.587	249	86

Source Calculations of the authors based on data of the Ministry of Finance of the Russian Federation and the Federal Service of State Statistics

16.4 Conclusion

In general, the use of the methodology of evaluating the educational potential of the regions for the economic security of Russia on the condition of digitalization allowed:

- assess educational potential in individual areas and obtain a comprehensive comparative assessment by region;
- find a quantitative measure for assessing the educational potential of regions, taking into account the operational network indicators of education, regional digitalization, economic and financial indicators;
- to determine the effective boundaries for assessing the educational potential of the regions, taking into account the operational network indicators of education, regional digitalization, economic and financial indicators;
- to determine directions of changes in the operational network indicators of education, regional digitalization, economic and financial indicators to achieve the values of the best regions.

The results obtained will serve to meet the information needs of federal and regional management. Evaluation of the numerical value by the level of educational potential allows making effective financial decisions at the state level that contribute to improving the quality and accessibility of education. All decisions are focusing on the training of highly qualified personnel, which affects the development of human capital as the main value of the state.

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Chapter 17
The Role of Vocational Education in the Implementation of Integration Mechanisms for the Economy's Development

Svetlana M. Markova, Svetlana A. Zinovieva, Ekaterina P. Sedykh, and Ekaterina A. Urakova

JEL Code Y800

17.1 Introduction

The modern development of socioeconomic systems of various levels, the expansion of integration mechanisms in economic sectors change the system of interconnections of various branches of the national economy, including the sphere of professional training of workers and specialists. The status of professional educational institutions is changing: from a sponsored basic enterprise, the educational institution becomes an equal partner not only in professional training, but also in retraining and advanced training of workers and specialists in the implementation of economic mechanisms and industry development (Gruzdeva et al., 2020).

As an organizational form of socioeconomic development of the country, a professional educational institution acts as a leading power for the economy's development and increasing its efficiency.

A professional educational institution is considered as a socio-economic system with contractual relations, with the creation of integration mechanisms with an internal hierarchy, with the creation of regional socio-production clusters.

In modern economic development, a professional educational institution is considered as an organization where the main problems are the training of workers and specialists in demand on the labor market, the development of partnerships between production and the educational system (Ilyashenko et al., 2019).

S. M. Markova (✉) · S. A. Zinovieva · E. P. Sedykh · E. A. Urakova
Minin Nizhny Novgorod State Pedagogical University, Nizhny Novgorod, Russia

E. P. Sedykh
e-mail: sedykh@mininuniver.ru

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The creation of integration mechanisms expands the capabilities of professional educational institutions: saving resources, joint scientific research, organizing vocational, educational, and production-technological support for the production process and training; providing vocational guidance and self-determination for young people; maintaining and developing complex interactions between education and production.

The aim of this article is to determine the role of vocational education for the implementation of integration mechanisms for the economy's development and to determine the influence of socioeconomic factors on the integration processes of vocational education.

17.2 Methodology

Establishing the interdependence of vocational education and integration mechanisms for the development of the economy is one of the important methodological issues of theoretical research on vocational education (Ilyashenko et al., 2018).

A holistic research of the relationship of educational organizations with other organizations and enterprises is possible only using the entire set of methods of scientific knowledge and practical transformation of reality. The content of each method constitutes techniques contributing to the implementation of goals and principles, which correct the process of obtaining knowledge.

In theoretical studies of problems of vocational education, general scientific methods acquire importance. General scientific methods have the following features:

- interrelation of general scientific, historical, and logical methods of cognition;
- complementing methods to ensure a holistic learning process;
- inextricable unity of analysis and synthesis in order to reveal the essence of integration processes.

The systemic approach is an interdisciplinary method allowing deeper penetration into the integration mechanisms of economics and vocational education (Garina et al., 2020). Due to the systematic approach, integrated curricula and programmes were developed, contractual relationships were established with other organizations (Vaganova & Lapshova, 2019).

A systematic approach addressed the following issues in the context of this research:

- constructing theoretical provisions based on system principles in order to describe integration mechanisms;
- managing the interconnectedness of economic and educational integration mechanisms;
- substantiation of integral entities characterizing integration processes.

Also, the research used private-scientific methods of research into the problems of vocational education:

– analysis of labor content of workers and specialists;
– historical and logical analysis of the vocational education's content (curricula and programmes);
– component analysis of professional competencies of the modern worker and expert (knowledge, abilities, skills);
– analysis of the professions' map;
– analysis and synthesis of integration processes;
– degree of utilization of scientific and technological progress, etc.

17.3 Results

Integration mechanisms are implemented in professional educational institutions through the labor, material, and financial resources of individual organizational structures. By providing studying, retraining, and advanced studying for workers and specialists, professional educational institutions provide enterprises with a personnel training service through the content and complexity of professions, organizing the production activities of students, and obtaining income from it.

Scientific and technological progress implies a new structure of the economy. Due to these conditions, integration mechanisms will be made, where innovative technological processes and flexible production are used, digitalization, robotization, biotechnology will be increasingly used (Watts, 2010a, 2010b).

Scientific and technological progress determines changes not only in the sphere of production, but also in the sphere of education, in the forms, methods, and means of teaching.

Consider structural changes in production providing the theoretical basis for the development of content and the process of vocational training. This is important because the country's economic and social development is linked to sectoral and intersectoral integration of production processes (Markova et al., 2016).

Innovative technologies are the most important area of scientific and technological progress. For example, membrane, laser, plasma, which use will increase the economic effect. High performance provides automation and robotics in today's environment.

Digitalization and its introduction into the organization and technology of production is a leading factor in the economy's development.

In modern conditions, the economy's development is associated with the creation of integration production complexes. Also, integration production complexes using digital technologies establish end-to-end automation of high-tech production (Watts, 2010a, 2010b).

The implementation of integration production complexes involves the introduction of the following trends in production development:

– development of the scientific and industrial type of production;
– development of digitalization of production;
– development of flexible automated technologies;

– increasing the role of the human factor in the development of automated production complexes.

In this regard, there are changes in the content and organization of labor of workers and specialists, where the systemically important factor is labor. The main task is to improve the quality of general education and vocational training of future workers who have professions, a culture of work, and moral standards (Markova et al., 2020a, 2020b).

With the implementation of integration mechanisms, the development of partnership relations, the introduction of educational and production clusters, the development of integration automated industries, the content and conditions of professional activity change: the development of cooperation and the division of labor, which occupy a dominant position; Improving work intelligence; greater integration of labor functions; the birth of integrated professions. All this contributes to the restructuring of the structure of professional training for an innovative economy (Fedorov et al., 2017).

In this regard, the organization of professional training of workers in groups of professions and professions of a wide profile (in integrated groups of working professions) becomes a priority.

Also, the training process should be restructured so that the worker shows a conscientious attitude to professional activity, has high professionalism and an active civic position. Workers and specialists should understand the prospects for the development of the profession, its role in public production.

The integration and differentiation of science, technology, and production, the creation of integration production complexes determine not only production, but also educational problems related to moral, social, and professional aspects.

Social aspects are reflected in the interaction of a professional educational institution with social reality, allowing us to satisfy the cognitive, personal, and professional needs of youth.

The orientation toward the creation of integration production complexes with automated, information and software means ensures a more efficient result. Through the creation of flexible automated industries, integration processes are implemented in high-tech production, digital technologies and software management are introduced to solve production problems; which lead to increased productivity and systemic economic impact (Markova et al., 2020a, 2020b).

Integration mechanisms and flexible production affect the change in the nature and organization of labor of the modern worker.

All this leads to the need for the development of professional educational institutions, the integration and differentiation of the content of labor of workers and specialists, the transition to the training of workers in integrated groups of professions, the manifestation of social functions in social, industrial, and cultural life (Romanovskaya et al., 2021).

Integration processes lead to the construction of a completely new model of training in accordance with the levels of professionalization.

The intersectoral level ensures the formation of professional competence, norms, and values of a general industrial intersectoral nature. They can be represented in the integration complexes of educational disciplines common to all professions.

At the industry-wide hierarchical level, general technical laws, trends, and scientific and technological progress characteristic of a certain branch of the economy are revealed, reflected in the content of general technical educational disciplines.

The general professional (integrated) level reflects the patterns of professional activity, psychological and pedagogical characteristics of the professional and personal qualities of future workers and specialists (Bulaeva et al., 2020). This level corresponds to the development of universal educational and program documentation for the training of workers and specialists with a high level of the formed professional competencies.

The fourth—private professional level is a narrow specialization.

Thus, these levels of professionalization require the implementation of the laws of socialization and professionalization of the personality of the worker and specialist, where the requirements of socio-technological types of production are a systemic factor.

The following requirements of scientific and technological progress for the training of skilled workers and specialists can be distinguished:

- raising the cultural level of young workers and professionals;
- development of vocational skills;
- development of digital thinking in conditions of production automation;
- increasing the role of polytechnic training in the formation of professional competencies;
- ensuring professional mobility, taking into account the individual needs and abilities of future workers and specialists, improving production efficiency;
- development of integrated curricula and programmes based on socioeconomic and techno-technological community;
- introduction of new systems of industrial training, new forms of organization of industrial labor;
- development of independent, creative, cognitive activity;
- organization of social partnership of professional educational institutions and industrial enterprises.

Integration processes in vocational education are becoming diverse and complex. Such forms include the creation of territorial clusters (combining different structures operating in the same sphere and complementing each other). Education and production clusters can include production structures, educational institutions, research institutes, government bodies, etc.

Integration mechanisms in economics and education involve obtaining a systemic effect with optimal use of all resources in order to increase the level of formation of professional competencies of future workers and specialists. The systemic effect is formed through:

– joint use of material, technical and organizational, and managerial resources (joint use of technologies and logistical support, advanced training of employees, formation of a single educational space, etc.);
– improving the quality of vocational education;
– use of production and educational technologies, production specialists, and scientific and pedagogical personnel;
– use of the potential of organizations, implementation of specific types of professional activities.

The influence of vocational education on the implementation of integration mechanisms for the development of the modern economy is manifested through the following indicators of the educational activities of higher educational institutions (on the example of Minin University):

– increase of contractual relations with enterprises, business structures, public administration bodies, professional educational institutions;
– increasing the integrated curricula and curricula developed;
– the importance of the mutual influence of production and educational technologies in conditions of social partnership in the process of vocational training.

The organization of social partnership allows you to increase the number of contracts with educational organizations and business structures (Fig. 17.1).

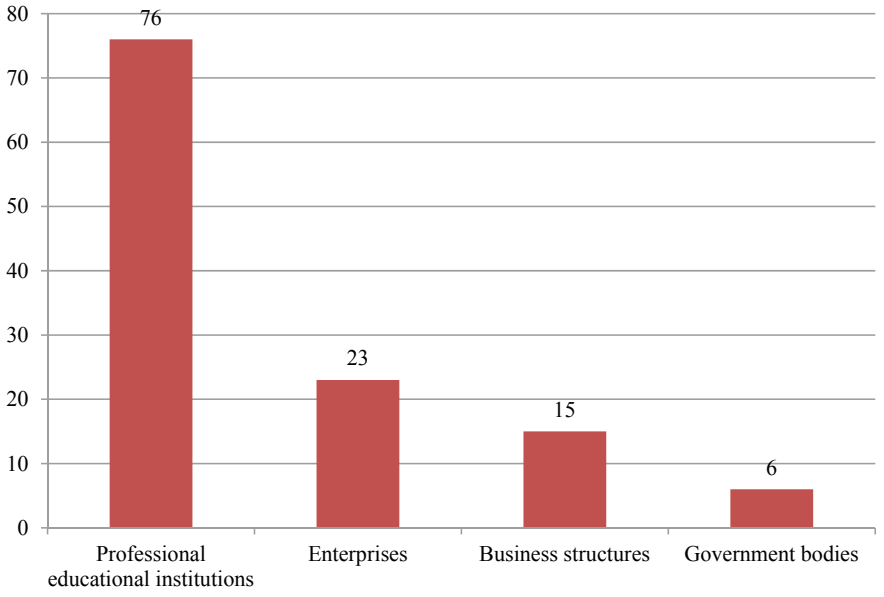

Fig. 17.1 The number of contracts with educational organizations and business structures. *Source* Compiled by the author

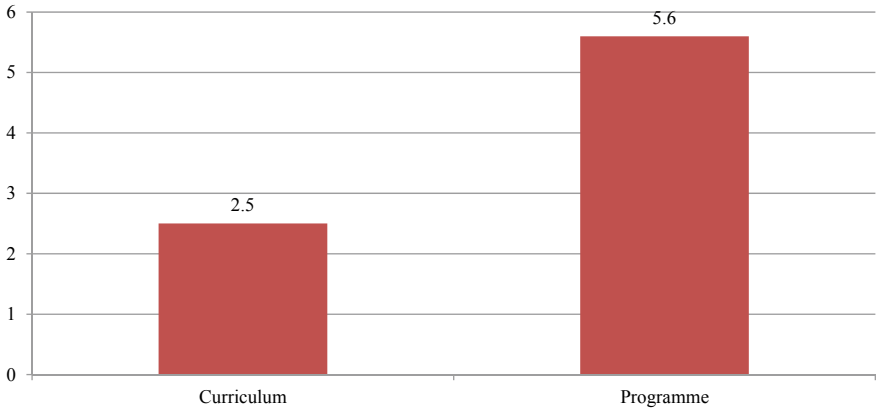

Fig. 17.2 The number of integrated curricula and programmes. *Source* Compiled by the author

Using the integration-modular approach, it was possible to develop and increase the number of integrated curricula and programmes (Fig. 17.2).

The interconnection of production and educational technologies ensures the improvement of the quality of theoretical training by 29%, practical by 35%.

17.4 Conclusion

Thus, the integration mechanisms of the development of the modern economy create conditions for the training of the creative, independent personality of workers and specialists. A new socio-political type of worker's personality arises. Integration mechanisms determine the preparation of workers of a wide profile, the development of universal curricula, integrated training programs, which makes it possible to ensure the need for production in a high-quality composition of workers and specialists.

For the successful implementation of integration mechanisms for the development of the modern economy, it is necessary:

- to develop strategic development of vocational education in accordance with economic growth prospects;
- to develop necessary conditions for advanced training in conditions of new technological structure;
- to create of educational and production complexes.

In this regard, integration is considered one of the most important factors in the development of the economy and education. We pay attention to such integration processes that allow us to combine the interests and competencies of education, production, and the state. In modern conditions, the creation of integrative structures

is a mechanism for the sustainable development of vocational education. The main tasks of this direction include:

- creation of an effective system of management of integration educational and production complexes;
- development of a system of strategic planning for the development of integration complexes;
- organization of contractual relations among educational structures and enterprises, providing training of workers and specialists for the innovative economy;
- increasing business financial investments in vocational education in order to train workers and specialists with specific competencies;
- seeking new mechanisms for the integration of professional educational institutions and business structures with a view to obtaining additional resources and expanding the market for educational services;
- organization of network interaction of educational structures with equal nature of cooperation.

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Chapter 18
Implementing the University's Sustainable Development Goals in the Context of Regional Economic Growth

Oleg A. Baulin, Irina V. Burenina, Ruslan R. Kazykhanov, Ruslan M. Mazitov, and Sofia F. Sayfullina

JEL Codes I20 · I25 · R11

18.1 Introduction

Regional economic growth is impossible without a fundamentally new qualitative development of universities as scientific and educational centers and places of concentration of talents worldwide. Such countries as China, Singapore, Hong Kong, and Australia are excellent examples of the rapid economic growth of the country. If we analyze the dynamics of growth (position change) in the international QS University Rankings (QS Quacquarelli Symonds, 2020), the universities from these countries have shown the most significant dynamics over the past ten years. Thus, out of the first 50 places in the ranking, Singapore universities ranked 11th and 12th, Hong Kong universities—25th, 32nd, and 46th, universities in China—16th, 22nd, and 40th, and universities in Australia—29th, 38th, 42nd, 43rd, and 47th.

The strategies of universities, as a rule, are aimed at the development of human capital, achievement of high results in advanced scientific areas, and commercialization of the results of innovation activities. A modern university should be a center of attraction for talented young people from all over the world, including students at all levels of education, researchers, innovators, and administrators.

As an independent entity, each university forms its strategy and chooses how to implement it. When forming a strategy, universities must rely on the national goals and strategic objectives of Russia's development and international documents, particularly the UN Sustainable Development Concept.

O. A. Baulin (✉) · I. V. Burenina · R. R. Kazykhanov · R. M. Mazitov · S. F. Sayfullina
Ufa State Petroleum Technological University, Ufa, Russia

E. G. Popkova and B. S. Sergi (eds.), *Digital Education in Russia and Central Asia*,
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The UN Sustainable Development Concept focuses primarily on human development. The world's universities rely directly and indirectly on the 17 UN Sustainable Development Goals (SDGs) in their sustainable development strategies and programs.

The paper aims to analyze and justify the need for the development of universities through the prism of the UN Sustainable Development Concept in order to make a targeted contribution to the economic growth of the region (country).

The research subject is the adaptation of the concept of sustainable development to the development strategy of universities, taking into account the priorities of regional (national) development.

The research stages are as follows:

(1) Highlighting the objectives of the UN Sustainable Development Concept, in the implementation of which universities play a significant role;
(2) Building relationships between university development directions (policies), the SDGs, and the development goals of the region (country);
(3) Development of recommendations for the formation of university development strategies, taking into account the SDGs.

18.2 Materials and Methods

The UN Sustainable Development Goals have 141 tasks (United Nations, 2015). As centers of the international environment and scientific and educational competencies, universities are obliged to serve as agents of the SDGs and develop their activities in achieving particular SDGs. The research highlighted the following relationships between the goals and objectives of the SDGs and the university's core processes (Table 18.1).

Currently, most Russian universities are building their development strategies until at least 2030 (the so-called 10-year cycle of full training "undergraduate, graduate, and postgraduate"). The university development strategy must be consistent with, commensurate with, and have a direct and indirect influence on the national development goals of the Russian Federation through 2030. In turn, the national development goals are reflected in the Executive Order "On the national development goals of the Russian Federation for the period up to 2030" (July 21, 2020 No. 474) (Presidential Executive Office, 2020) and the "Scientific and technological development strategy of the Russian Federation" approved by the Executive Order No. 642 of December 1, 2016 (Presidential Executive Office, 2016). In accordance with these documents, universities use development programs to build strategies to position these universities as international centers of attraction for young people and scientists from different countries. Such a strategy cannot be built without embedding the UN Sustainable Development Concept in certain areas of university development. For example, the chosen fronts of science should at least not contradict the goals in the field of ecologization, energy efficiency, and preservation of ecosystems (Gavrilieva et al., 2018).

Table 18.1 Relationships between the goals and objectives of the UN Sustainable Development Concept and the core processes of the university

Core process of the university	Objectives of the UN sustainable development concept	Possible contributions of a university to the goals and objectives of the UN sustainable development concept
Education	• Ensuring the accessibility of education for different groups of population • Gender equality—improving access to education for women • Increasing the level of education of young people • Providing access to education for low-income groups	• Formation of educational policies aimed at different groups of the population, including low-income groups • Formation of a youth policy focused on the involvement of young people in entrepreneurship and the formation of an active and healthy lifestyle • Development and implementation of social projects aimed at supporting people in need • Creating conditions (campus, information environment) for the implementation of educational and youth policies • Educational work among the population
Research Innovation	• Improving the efficiency of the use of the planet's water resources • Development of advanced hydrocarbon processing technologies and green energy • Development of technologies for recycling and rational use of natural resources • Preventing the effects of climate change • Developing technologies for the conservation of marine ecosystems • Developing technologies for conserving terrestrial ecosystems	• Conducting research and implementing projects in different areas • Support of initiated projects in areas, including financial • Cooperation with research centers, including international cooperation

Source Compiled by the authors based on Bobyleva et al. (2016), Gubkin University (2019), Peter the Great St. Petersburg Polytechnic University (2020), Ufa State Petroleum Technical University (2021), United Nations (2015)

In turn, universities are key actors in implementing sustainable development in the regions, along with large industrial companies and state and municipal governments. One of the strategies of the university can be the formation of an ecosystem of preservation and development of human capital in the region (Luksha et al., 2018) based on the achievement of SDGs.

Table 18.2 shows the relation of the policies of the model program for university development related to the SDGs.

In our opinion, the role of universities in achieving the goals of innovative development of the regions should be as follows:

- Attraction, accumulation, and development of talented youth;
- Implementation of research in frontier areas of the global research agenda;
- Creation of an environment conducive to the formation of responsible human behavior toward nature, ecology, and one's health.

According to the authors of the study, the resulting indicator reflecting the effectiveness of the implementation of the university strategy should be an increase in human capital in the region. It is expressed in the following:

- Increase in the proportion of international students and the retention of talented high school graduates in the region;
- Increased research in cutting-edge areas and increased visibility of the region in the global research community;
- Increased investment in the commercialization of the results of R&D and the creation of jobs in new production facilities;
- Improving the standard of living in the region and the quality of the environment, including addressing environmental problems and poverty.

Thus, the authors justify the necessity of considering the objectives of different programs and concepts in the formation of a strategy for the development of the university as one of the main stakes in regional development.

18.3 Results

The proposed approach was tested on the example of the Republic of Bashkortostan and its largest university—Ufa State Petroleum Technical University (USPTU).

According to the study of the Higher School of Economics "Assessment of the contribution of regional higher education systems to the socio-economic development of Russian regions" (Leshukov et al., 2017), the Republic of Bashkortostan has a moderate level of influence (two indicators (contribution to economic development and contribution to innovative development) out of three have values below average) following the types of regional higher education systems. This indicates the lack of serious influence of higher education on the main directions of regional development and the potential for the growth of such influence on the economic development of the region (Lozano et al., 2013).

Table 18.2 Linking the areas of university development strategy, SDGs, and regional development goals

Direction of university development (policy)	UN sustainable development goals	Indicators reflecting the achievement of regional development goals
Education policy	Goal 4—Quality education Goal 8—Decent work and economic growth	• Increase in the proportion of researchers under 39 years of age • Growth of nonresident and international students
Research policy	Goal 6—Clean water and sanitation Goal 7—Affordable and clean energy Goal 13—Climate action Goal 14—Life below water Goal 15—Life on land	• Increase in the share of R&D in the GDP or GRP • Growth in invention patents • Increase in the number of articles indexed in international databases • Increase in the number of advanced manufacturing technologies
Policy of knowledge and development transfer	Goal 9—Industry, innovation, and infrastructure Goal 12—Responsible consumption and production	• Increase in the number of advanced manufacturing technologies • Growth of high-tech products in total shipments • Growth of non-commodity exports • Growth of investment in fixed capital • Increase in the share of employees who have completed additional professional education programs
Youth policy	Goal 1—No poverty Goal 2—Zero hunger Goal 3—Good health and well-being Goal 5—Gender equality Goal 8—Decent work and economic growth Goal 10—Reduced inequalities Goal 12—Responsible consumption and production Goal 14—Life below water	• Increase in the proportion of researchers under 39 years of age • Growth of nonresident and international students

(continued)

Table 18.2 (continued)

Direction of university development (policy)	UN sustainable development goals	Indicators reflecting the achievement of regional development goals
Personnel policy	Goal 1—No poverty Goal 3—Good health and well-being Goal 5—Gender equality Goal 8—Decent work and economic growth Goal 10—Reduced inequalities	• Increase in the proportion of researchers under 39 years of age • Increase in the share of employees who have completed additional professional education programs
Campus policy	Goal 6—Clean water and sanitation Goal 9—Industry, innovation, and infrastructure Goal 10—Reduced inequalities Goal 11—Sustainable cities and communities Goal 15—Life on land	• Increase in the proportion of researchers under 39 years of age • Growth of nonresident and international students
Informatization and digitalization policy	Goal 16—Peace, justice, and strong institutions Goal 17—Partnerships for the goals	• Growth of nonresident and international students
International policy	Goal 1—No poverty Goal 2—Zero hunger Goal 4—Quality education	• Increase in the number of articles indexed in international databases • Growth of non-commodity exports
Talent attraction policy	Goal 4—Quality education Goal 8—Decent work and economic growth	• Increase in the proportion of researchers under 39 years of age • Growth of nonresident and international students
Cooperation policy	Goal 17—Partnerships for the goals	• Increase in the number of articles indexed in international databases
University management policy	Goal 16—Peace, justice, and strong institutions Goal 17—Partnerships for the goals	• Cumulative growth of indicators

Source Compiled by the authors based on Abdrakhmanova et al. (2020), Bobyleva et al. (2016), Burenina et al. (2018), St. Petersburg University (2021), United Nations (2015)

In recent years, the Republic of Bashkortostan pursues an active scientific and educational policy, which resulted in creating the world-class Eurasian Scientific and Educational Center in 2020. All universities in the Republic participate in the project and contribute to the achievement of the goals stated. By the end of 2020, no university of the Republic was included in any international ranking. Thus, universities are poorly represented in the international research agenda.

The transformation of universities seems one of the priority tasks of the scientific and educational policy of the region. The primary goal of the transformation of universities in the region is to increase their positions in the Russian rankings and enter the international rankings (Burenina et al., 2018). It is impossible to achieve this goal by relying only on regional resources. New educational and research programs are planned to be developed and implemented in partnership with leading Russian and foreign universities. It is equally important to attract leading researchers and professors to the Republic of Bashkortostan, including specialists from international educational and research centers.

Nevertheless, the human resource potential of the Republic of Bashkortostan is relatively high. Thus, the Republic of Bashkortostan is among the ten regions of the Russian Federation with the largest agglomerations. Moreover, the Republic has a high concentration of high-tech industries and knowledge-intensive services, which is a favorable factor for preserving and attracting human capital.

The demonstration of work on the achievement of the SDGs by the universities of the Republic of Bashkortostan is one of the steps to integrate into the international educational system. The principles and objectives of sustainable development are laid down in the development strategy of universities and the objectives of the economic development of the region.

The results of the analysis of the implementation of sustainable development programs of leading Russian universities [St. Petersburg State University, National University of Oil and Gas "Gubkin University" (Gubkin University, 2019), Peter the Great St. Petersburg Polytechnic University (Peter the Great St. Petersburg Polytechnic University, 2020; United Nations, 2015), and others] showed their integration in the UN Sustainable Development Concept and the long-term development strategy of the universities themselves.

Ufa State Petroleum Technical University has formulated its first sustainability results for the period 2018–2020 (Ufa State Petroleum Technical University, 2021). Table 18.3 presents the main results achieved by USPTU in accordance with the UN Sustainable Development Goals.

The analysis of the implementation of activities within the framework of achieving sustainable development goals of the Ufa State Petroleum Technical University showed that the efforts made were not systematic and rather superficial. Simultaneously, the university has laid the groundwork for further integration with the global community to achieve sustainable development goals.

Possible directions for increasing the USPTU's contribution to achieving the goals of sustainable development for the next five years can be formulated as follows:

Table 18.3 The main results of USPTU in the framework of sustainable development for the period 2018–2020

Sustainable development goal	Main results
1. No poverty	(1) Increase in the average wage by 1.23 times (2) Social support for employees over 8 million rubles annually (3) Increasing social scholarships by 1.56 times to 60 million rubles (4) Corporate Scholarship Fund of over 55 million rubles (5) Social support for students from the trade union is over 2 million rubles annually (6) There are 123 international students from 16 UN Least Developed Countries
2. Zero hunger	(1) Food aid for international students remaining at the university during the pandemic (2) A pool of functional foods has been developed (3) Composites were created to stimulate crop growth
3. Good health and well-being	(1) 75 sporting events per year from intramural to international level (2) 1,415 students are recuperating at various institutions (3) Annual campaign "Students for an AIDS-Free future" (4) Conducting anti-epidemiological measures
4. Quality education	(1) Qualitative and quantitative growth of admission of students, including the growth of targeted training by two times (2) Introduction of new training formats and new competencies "Skills of the twenty-first century" (3) Introduction of e-platform for oil and gas education (4) Increase in the number of international students to 1,252 (5) Considerable growth of additional education programs
5. Gender equality	(1) At the university, 59% of women and 41% of men, including in leadership positions
6. Clean water and sanitation	(1) Reducing water consumption by a factor of 1.5 (2) About ten technologies for purifying water from various impurities have been developed
7. Affordable and clean energy	(1) All projects of construction, reconstruction, and repair of buildings are carried out on the principle of energy efficiency

(continued)

Table 18.3 (continued)

Sustainable development goal	Main results
8. Decent work and economic growth	(1) New faculty statuses and elements of an effective contract have been implemented (2) The average salary of graduates is 1.5 times higher than the average salary in the region
9. Industry, innovation, and infrastructure	(1) Participation in federal projects and consortiums, such as the "World-class Science Center," "World-class Science and Education Center," and "Nedra" (2) Multiple growths of income of small innovative enterprises
10. Reduced inequalities	(1) International Club of USPTU (1,000 students) (2) Foreign Language Club of USPTU (3) International partner events
11. Sustainable cities and communities	(1) Comprehensive development programs for municipalities, districts, and cities (2) Development of the USPTU campus on the open environment principle
12. Responsible consumption and production	(1) World-class scientific center in the field of environmentally friendly resource-saving energy and efficient rational use of subsoil and biological resources "Rational development of liquid hydrocarbon reserves of the planet" (2) School of Environmental Education
13. Climate action	(1) Technology to reduce the impact of greenhouse gases causing climate change (2) Master's program "Alternative and Renewable Sources and Energy Storage"
14. Life below water	(1) Scientific and educational projects in the area: "Safety and environmental friendliness of offshore production, collection, transportation, and storage of hydrocarbons and oil and gas projects of the Arctic shelf"
15. Life on land	(1) Development of a spectral database of substances to determine the energy potential
16. Peace, justice, and strong institutions	(1) Open lectures "Combating Corruption in Educational Organizations"
17. Partnerships for the goals	(1) Partners—105 universities from 31 countries (2) Association of Russian-Azerbaijani Universities

Source Compiled by the authors based on Ufa State Petroleum Technical University (2021)

(1) Updating the research agenda and incorporating new vectors into the university's existing research schools related to the development of the urban environment, combating climate change, and preserving ecosystems;
(2) Development and implementation of practice-oriented educational programs, primarily at the level of master and postgraduate programs in areas relevant to the global community.
(3) Expansion of cooperative ties with leading Russian and foreign scientific and educational centers, implementation of joint research and educational projects.

The key areas of research for USPTU are as follows:

- Preservation of ecosystems in hydrocarbon production and processing, including the development of new technologies for water, soil, and air treatment;
- Improving the efficiency and safety of energy supply systems, including the development of alternative energy;
- Development and implementation of comprehensive programs for the development of territories, including the formation of agglomerations.

These research areas are of high importance for the region, given the damage caused to the environment by the activities of large industrial enterprises.

As seen in the example of Ufa State Petroleum Technological University, the realization of the SDGs is possible only by integrating with the world community and building long-term partnerships with other universities, businesses, and authorities.

The concept of sustainable development affects all areas of the university. The more actively the university works to achieve sustainable development goals, the more chances it has to move up in the top international rankings. It should be noted that the top of the international rankings is, in fact, a reflection of the effectiveness of the implementation of the chosen strategy and the formulated policies of the university.

Thus, the authors demonstrated a direct correlation between the strategy of the university and the goals of the UN Sustainable Development Concept.

18.4 Conclusion

The research allows the authors to draw the following conclusions:

(1) Growth of economic development of the country (or a separate region) is impossible without the significant development of the science and education system as the main drivers of this growth and concentration of resources of science, education, and business in one territory;
(2) University development program should be based on certain policies (including international), comply with several principles (including openness), and be a driver of the development of the regional ecosystem from a technological and competitive point of view;

(3) Based on the 17 goals, the UN Sustainable Development Concept should be linked to the development strategy of universities for identifying a set of tools for the development of human society and minimizing the existing problems.

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Chapter 19
Role of Universities in Sustainable Rural Development

Alexander P. Gorbunov, Tatiana V. Kasaeva, Alexander P. Kolyadin, and Andrei F. Dorofeev

JEL Code I 250

19.1 Introduction

Education is a key factor determining the competitiveness of an area. For this reason, the contribution of higher education institutions (HEIs) to the socioeconomic development of various areas has become increasingly discussed and relevant in recent decades. This issue is especially prominent in regional economic and innovative development.

HEIs are beginning to be seen as drivers of regional development, and their contribution to human capital is regarded as the basis for long-term economic development.

Public and private investments in education are increasing every year. Since the beginning of the twenty-first century, OECD countries have increased their spending on higher education by 23% of GDP. Russia demonstrates an even faster growth rate. However, the ratio of investment in human capital to GDP in the Russian Federation

A. P. Gorbunov · T. V. Kasaeva (✉) · A. P. Kolyadin
Pyatigorsk State University, Pyatigorsk, Russia
e-mail: kasaeva@pgu.ru

A. P. Gorbunov
e-mail: gorbunov@pgu.ru

A. P. Kolyadin
e-mail: kolyadin@pgu.ru

A. F. Dorofeev
Belgorod State Agricultural University, Belgorod, Russia
e-mail: dorofeev@bsaa.edu.ru

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is still lower than in developed countries. While South Korea and Great Britain spend 2% and 1.8% on education, respectively, Russia spends about 1.2% (OECD, 2016). In several countries, education is one of the main exports. For instance, in Australia, revenues from the export of educational services are second only to ore, coal, and gas exports (Basillote et al., 2016).

The development and accessibility of higher education affect the national economy and the overall spatial development of the country and the intra-regional spatial structure.

This study aims to identify the relationship between spatial changes and the accessibility of higher education and determine the influence of digitalization in higher education on the spatial development of the country.

We employed methods of mathematical statistics, primarily correlation analysis. Correlation analysis has shown that the availability of higher education acts as the driver of spatial development and contributes to the growth of economic activity, meaning that areas with limited access to higher education have lower economic activity.

19.2 Materials and Methods

The twenty-first century saw the development of several approaches for assessing the contribution of higher education to different aspects of society. We shall consider each of them in detail.

The traditional economic approach views higher education institutions as creators of the regional economic base. Federal funding for universities produces new jobs, raises salaries, and consequently improves the standard of living in the regions.

According to Elliott et al., the main task of the traditional approach lies in the following philosophical questions: "What would happen if there were no universities in the regions?" and "How much would the number of jobs and the standard of living decrease in this case?" Proponents of this approach suggest using the following six parameters to assess the economic impact of higher education (Elliott et al., 1988):

- Determining the scale and type of the settlement chosen for analysis;
- Analyzing external investments in the HEIs (subsidies, grants, etc.);
- Conducting sociological survey among employees and students of regional HEIs to determine the number of students who would migrate to another region if their own region lacked HEIs;
- Aggregating the second and third parameters;
- Estimating the tax revenues of the regional budget;
- Selecting and evaluating suitable multipliers that determine the economic efficiency of HEI.

Although the traditional approach provides a clear picture of the contribution of universities to the economy, it does not allow accounting for some indirect factors (acquisition of new skills, changes in the qualifications of employees, etc.).

Bluestone extended the set of criteria for evaluating the impact of universities on the region's economy. He added the evaluation of employee qualifications since highly qualified employees earn more income and are more productive, thus contributing more in tax revenues for the regional budget (Bluestone, 1993). This approach is called the skill-based approach. According to Bluestone's approach, three more points should be added to the parameters of the traditional approach:

- Calculating the net income of university graduates who are employed in the same region where they graduated, subtracting the net income received without higher education;
- Discounting the results, taking into account future wage increases and decreases;
- Analyzing tax revenue related to wages of university graduates, subtracting the cost of obtaining an education.

This approach accounts for the difference between the incomes of university graduates and those without higher education. Therefore, it allows analyzing opportunity costs incurred when a worker enters the labor market directly, bypassing higher education.

A new classification that accounts for short-term and long-term dichotomous effects was proposed by Battu et al. (1998). Various skills, abilities, and forms of tangible capital cannot fully adapt to demand indicators in the short term. New industries and enterprises emerge only in the long term. Consequently, the assessment should also entail analyzing the effects of newly formed industries and new technological developments.

The innovative approach allows assessing the contribution of an HEI to the innovative development of the region. It was used in the works of Huggins et al. The innovative approach allows analyzing how universities create new knowledge and then implement it in the socioeconomic and manufacturing domains of the region (Benneworth & Charles, 2005; Bok, 2003; Cooke, 2004; Etzkowitz, 2003; Huggins & Johnston, 2009). To assess the innovation and research potential of universities and their contribution to regional development, these scholars suggest using the following parameters:

- Number of inventions and patents received;
- Number of new spin-out or spin-off enterprises;
- Number of scientific studies written by university staff and published in journals and books;
- Recognition and credibility of the university as a research center.

In 2007, a new comprehensive approach was proposed. It was tested in 12 countries—Australia, Brazil, Canada, Denmark, Finland, Korea, Mexico, the Netherlands, Norway, Spain, Sweden, and the United Kingdom. A little later, the Russian Federation was added to this list. This approach allows for a comprehensive assessment of the impact of higher education on regional economies. The approach is based on three blocks.

The first block includes the contribution of higher education to the innovative development of the region (creation of high technologies in universities and

small businesses, growth of cooperation, and strengthening of innovative university activities in the region).

The second block deals with the contribution of universities to the development of regional human capital (increasing access to education, finding and attracting talented students, creating a continuous system of higher education, supporting entrepreneurial activity, etc.).

The third block includes the contribution of universities to sociocultural and environmental development (developing the cultural environment, improving the environmental and demographic situations in the region).

However, different sociodemographic and economic conditions complicate the assessment. Moreover, the development of the higher education system varies from region to region (Bluestone, 1993).

These approaches were integrated by scientists of the Higher School of Economics, who suggested assessing the contribution of higher education systems to the regional socioeconomic sphere using three following blocks (Leshukov & Lisyutkin, 2015):

1. Contribution to regional economic development (tax revenues from universities, tuition costs and living expenses paid by students coming from other regions, ratio of academic staff salaries to regional average salaries);
2. Contribution to human capital development, defined as the difference between the wages of workers with and without higher education (can be calculated via Mincer function, which accounts for the place of employment and experience of employees, different levels of their education, etc. (Lukyanova, 2010)), and also as the employment rate of university graduates in the region, relative to the total number of employed;
3. Contribution to the innovative regional development, measured by the indicator "Contribution of Universities to the Total Regional Expenditure on R&D," as well as the income from the commercial use of innovations and publications (number of publications over the past five years and the ratio of citations in the databases of the Russian Science Citation Index and Scopus per 100 academic employees) (Lapaev, 2014).

The analysis allowed obtaining three sub-indices. The leading territories in the block "Contribution to Regional Economic Development" were Moscow City, St. Petersburg City, Moscow Region, Leningrad Region, Tomsk Region, Novosibirsk Region, and Sverdlovsk Region. These areas host major universities with high-income indicators, able to attract students from other regions (Kashnitsky et al., 2016).

Completely different regions lead in the "Contribution to Human Capital Development" subindex: the Republic of Tuva, the Republic of Sakha (Yakutia), and the Sakhalin Region. Education in these regions is developing in a special way. These regions offer one of the most developed networks of secondary vocational education, while HEIs are underdeveloped—the regions often host a leading university and a few of its few branches. This low accessibility of education contributes to its growing value.

As for the "Contribution to the Regional Innovative Development" subindex, Moscow City and Moscow Region lead again, followed by Irkutsk Region, Tomsk Region, and Stavropol Territory.

The scholars summarized their findings by categorizing the regions by average values of sub-indices. We note that these categories do not represent the development of the higher education system, but only its contribution to some areas of social life. As a result, four types of higher education systems were identified by the scholars:

1. Drivers of regional development—above-average values of sub-indices (Moscow City, St. Petersburg City, Moscow Region, Leningrad Region, Krasnoyarsk Territory, Republic of Tatarstan, Republic of Kalmykia, Republic of Sakha, and the Chechen Republic).
2. High level of influence—two above-average sub-indices (18 regions, 11 of which stand out due to the "Economic Development" and "Human Capital Development" sub-indices).
3. Moderate level of influence—two above-average sub-indices (36 regions).
4. Low level of influence—all sub-indices are below average (15 regions).

Literature analysis suggests that it is possible to quantify the contribution of HEIs to territorial development at different hierarchical levels. The results of this quantitative assessment can form the basis of development policy for higher education.

In this study, we aim to identify the dependence of spatial changes on the accessibility of higher education, as well as the impact of digitalization in higher education on the spatial development of the country.

We propose treating spatial changes as two opposing trends: spatial growth and spatial contraction. Spatial growth is defined as an increase in the intensity of territorial development, manifested in the concentration of population and economic activity on the territory; the spatial contraction is an inverse process.

The working hypothesis in this study takes the following form: areas with access to higher education usually grow spatially, while areas that lack higher education institutions contract. Digitalization trends are more than a systemic challenge for higher education, as they can dramatically change the configuration of higher education and lead to major spatial transformations.

We employed methods of mathematical statistics, primarily correlation analysis. To test the hypothesis, we chose two indices: accessibility of higher education and the indicator of spatial changes. The accessibility of higher education in the region is reflected in the number of students enrolled in bachelor's, specialist's, and master's degree programs per 10,000 people. As key indicators of spatial growth or contraction, we chose the migration coefficient (trends in population concentration on a certain territory) and growth of GRP per capita over the past five years (which signifies the intensity of economic activity).

19.3 Results

Correlation analysis revealed a high correlation dependence between GRP growth in 2014–2018 and the number of students enrolled in bachelor's, specialist's, and master's degree programs per 10,000 people. The correlation coefficient was 0.895, and the determination coefficient was 80%. This suggests that, in 80% of cases, the growth of the higher education students leads to the growth of GRP. Therefore, it is fair to say that availability of higher education acts as a driver of spatial development and contributes to the growth of economic activity, while areas with low access to higher education have lower economic activity.

At first glance, there is no correlation between the migration rate per 10,000 people and the number of students enrolled in HEI programs per 10,000 people. The correlation coefficient between these indices is 0.06, and the determination coefficient is only 0.4%. However, the situation is different at the intra-regional level. For example, the correlation coefficient in Stavropol Territory between the migration growth of the population and the given contingent of students in higher education programs was 0.94, and the determination coefficient was 88%—in 88% of cases, the migration growth was determined by the number of students in higher education (Table 19.1).

Therefore, the recent consolidation of universities is somewhat controversial. On the one hand, such policy increases the quality of educational services, but on the other hand, it contributes to further spatial contraction of territories.

One effective way to resolve this dichotomy is to adopt a dual-education system—it allows students to obtain theoretical training at an HEI and simultaneously develop practical skills at a real workplace.

Dual-education system emerged in such countries as Germany, Austria, and Switzerland (Solga et al., 2014). Later, the system model was adopted in Greece, Italy, Spain, China, Sweden, Romania, South Korea, and some African countries (Eisenmann, 2017). The development of the dual-education system in Russia has started in the past decade. In 2013, the federal pilot project for the development of dual education in the Russian regions was launched; it initially included ten constituent entities of the Russian Federation, followed by three more regions in 2015. However, this project was mainly focused on secondary vocational education. We believe that transferring the accumulated experience of dual training to HEIs will limit the rate of spatial contraction, especially in rural areas.

The pandemic has triggered a global push toward online engagement. While Philip Altbach and Hans de Wit, well-known Western experts in higher education, doubt that the pandemic will cause a technological revolution in higher education, it is clear that the use of distance learning technologies will expand significantly (Altbach & de Wit, 2020).

The combination of dual-education system and distance learning may contribute to creating a new generation of practice-oriented online universities. These universities could increase the accessibility of higher education to residents of remote areas,

Table 19.1 Analysis of correlation between the migration growth and HEI student inflow in Stavropol Territory

Districts of the Stavropol territory	Migration inflow, people	University students inflow, people
Alexandrovsky District	−139	0
Andropovsky District	−207	0
Apanasenkovsky District	−370	0
Arzgirsky District	−254	0
Budenovsky District	−824	355.9
Grachevsky District	−271	0
Kochubeyevsky District	−495	0
Krasnogvardeisky District	−57	0
Kursky District	−238	0
Levokumsky District	40	0
Novoseletsky District	−36	0
Predgorny District	−42	0
Stepnovsky District	−153	0
Trunovsky District	−482	0
Turkmenovsky District	−102	0
Shpakovsky District	13,880	25,460.8
Stavropol	2441	979.1
Essentuki	1374	248.3
Zheleznovodsk	−289	64.1
Kislovodsk	360	107.6
Lermontov	369	1413.75
Nevinnomyssk	619	8685.55
Pyatigorsk	−190	355.9
Budennovsk District	−851	0
Georgievsky District	491	0
Izobilnensky District	−439	0
Ipatovsky District	−235	0
Kirovsky District	−187	247.3
Mineralovodsky District	−328	0
Neftekumsk District	−402	0

(continued)

Table 19.1 (continued)

Districts of the Stavropol territory	Migration inflow, people	University students inflow, people
Novoalexandrovsky District	−379	0
Petrovsky District	−605	0
Sovetsky District	−36	0
Correlation coefficient*	0.94	
Determination coefficient*	0.88	

Note *We considered Shpakovsky District and Stavropol as a single territory when we calculated the correlation and determination coefficients since Shpakovsky District surrounds Stavropol and its residents use the educational infrastructure of Stavropol.
Source Compiled by the authors based on Main Information and Computing Center of the Ministry of Education and Science (2019) and Department of the Federal State Statistics Service in the North-Caucasian Federal District (2019)

reducing the population outflow. However, the creation of an effective online education system will need a large amount of time and resources, as well as support from the main stakeholders involved in the development of high-quality practice-oriented online education (regional and municipal authorities, businesses based in a particular territory).

Russian and foreign experience in the implementation of the dual-education system revealed several limitations. The digital dual-education system can be implemented in industrial and agricultural universities, but is severely limited in training professionals for the public sector, medical professionals, and teachers. The limits of the dual-education system and distance learning should be clearly established.

19.4 Conclusion

The analysis of scholarly literature and conducted assessment confirm that accessibility of higher education has a significant impact on spatial changes on both the national and regional levels. Providing access to higher education in remote areas slows their spatial contraction due to reduced population outflow. Moreover, it improves the quality of human capital, thus increasing economic activity, especially in rural areas and small provincial cities.

The most promising way to ensure the accessibility of higher education is to introduce a dual-education system with distance learning technologies. This would allow developing knowledge-based competencies and training industrial and agricultural professionals in remote areas.

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Chapter 20
Management of Sustainable Socio-Economic Development of the Territory and the Education System in the Transition to the Innovative Model of Economic Development

Natalia I. Morozova, Tatiana V. Opeykina, Natalia I. Korobkina, Olga E. Savitskaya, and Elena A. Radionova

JEL Codes P32 · O13 · O15

20.1 Introduction

The key factor in developing the new society is information, which is converted into knowledge by people. Information has always been of great importance for economic development, but only with the advent of digital technology has it become an economic resource helping create additional value, not only realize communicative and cognitive functions.

The dynamism of the external environment leads to rapid obsolescence of knowledge. There appeared a concept of the shelf life of professional skills and abilities. A person is forced to carry out learning throughout their working life, constantly completing and updating their competence profile. Moreover, a person should be prepared to change the trajectory of their professional activity if necessary. The qualification of human resources, their knowledge, and humanitarian understanding

N. I. Morozova (✉) · T. V. Opeykina
Volgograd Cooperative Institute (Branch) of the Russian University of Cooperation, Volgograd, Russia

T. V. Opeykina
e-mail: otv06@bk.ru

N. I. Korobkina
Volgograd State Socio-Pedagogical University, Volgograd, Russia

O. E. Savitskaya · E. A. Radionova
Volgograd Branch of the Plekhanov Russian University of Economics, Volgograd, Russia

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of the essence of current phenomena create additional value in the value chain. For example, for products such as software, the degree of involvement of knowledge in forming their value is close to 100%.

Additionally, the growing flow of information in the modern world is so high that people cannot cope with it alone. Electronic assistants and artificial intelligence (AI) come to help, allowing us to carry out a deep and comprehensive analysis of large volumes of data, get the most out of them, and obtain an unprecedented level of accuracy from their analytical processing.

Should we fear the inevitable progress? How will natural and artificial intelligence interact? Futurologists and visionaries suggest different scenarios for future events—from the peaceful coexistence of natural and artificial intelligence to their antagonism and confrontation. Can humanity meet the challenges of the digital economy? The vector of socio-economic development of the territory and the level of well-being of each person depends on the answer to these questions.

20.2 Materials and Methods

The methodological basis of our research is general scientific methods, particularly analysis and synthesis. The analysis allows to isolate and examine the individual parts of the research object. However, this is not just a mechanical division of integrity. The cognition results in a transformation of the research object and the definition of its essential features. Next, with the help of synthesis, the previously studied parts are combined into a single whole to recreate the universal properties of the object in various manifestations and integrate new relationships and connections with other objects into the cognitive process. In thought operations, they act as complementary techniques, connecting the general and the singular, the unity and the multiplicity into a particular whole.

Thus, combining analysis and synthesis, we provide a systematic (integrated) approach to studying complex (multi-element) phenomena of social life.

Of particular interest to the research is the education system, which is transforming along with the evolution of society, improving its functions and the range of services provided. The development of the education system is accompanied by quantitative and qualitative changes and structural transformations of the whole system and its main elements and connections (social and organizational structures, socio-economic relations, social status and interests of the participants, institutions of the education system, etc.). In turn, these changes and transformations require further development of theoretical and methodological foundations for the functioning and innovative development of education as a socio-economic system aimed at implementing educational and upbringing functions in the formation of a person of the future with the set of competencies adequate to the challenges of an innovative society.

Like any social system, the education system consists of a subject–object relationship, which has three basic elements: subject, object, and causality between them. In this triad, the subject possesses the will. Thus, the subject is the key element capable

of creating, changing, and terminating any relationship, thereby keeping a particular system in a certain state.

If we refer directly to the education system, the object will be key competencies, and the subject—human resources. Currently, the slogan "Human resources is everything" is relevant as never before. Society will achieve high results in high technology and take a leading position only if it has a high human resource potential.

20.3 Results and Discussion

Agriculture can receive certain benefits from the use of advanced technology. Intelligent farm machinery will perform labor-intensive agricultural operations, helping to replace human labor, minimize the harmful effects of chemicals on people and the environment, and increase the profitability of agricultural production and the yields of crops. The introduction of advanced technology will solve staffing problems in rural areas and increase the attractiveness of this area for young and creative people.

Nowadays, such a program as "smart farming" or "precise farming" is becoming increasingly popular in leading countries. According to analysts at investment bank Goldman Sachs, global spending on the automation of agribusiness totaled $5 billion in 2019. This cost included all the costs of any technology adapted to the needs of agriculture: developments in artificial intelligence, communication, sensor systems, positioning, and automatic control. Analysts predict that by 2050 the market will grow to $240 billion (Maksimushkina, 2020; Volobueva, 2020). This volume will solve the problem of food security around the world.

According to another respected publication—Business Insider, the segment of the Internet of Things in agriculture is estimated at $43 million with a forecast growth to $75 million by 2020. According to Markets and Markets, the adoption of artificial intelligence in agribusiness shows a growth rate of 22.5%, and the capacity of this market could reach $2.6 billion in 2025 (GEOLiNE Technology, 2018).

Roland Berger estimates the value of the precision farming market at €3 billion in 2016, with a forecast of €4.5 billion for 2020. The USA, where the penetration level of new technologies in agriculture is the highest, accounts for more than 40% of the global market (GEOLiNE Technology, 2018).

By the digitalization of agriculture, Russia ranks only 15th in the world, even though it has enormous potential in terms of land, labor, biological, and other resources and their effective use. Russia has accumulated some experience in implementing IT technologies in agribusiness. Hybrid breeding, selection, agrobiology, and GMOs are widely known in the market for innovative technologies. Satellite positioning technologies, GIS-systems and monitoring systems, and control of machinery and quality of work performed are in the highest demand. The markets for agricultural ERP systems, control, and accounting systems in various branches of agricultural production, and specialized data and programs for their storage, processing, and making correct and timely decisions are developing rapidly (Volobueva, 2020).

Thus, the introduction of advanced technology in the agricultural sector of Russia will bring it to a new technological level of development, which will solve the problem of the country's food security and make this industry more attractive to young people, thereby stopping the outflow of population from rural areas.

A modernization of the education system and a new model of training for work in the agricultural sector can act as a certain unifying beginning and trigger for the development of the agro-industrial complex (Tinyakova & Morozova, 2018; Tinyakova et al., 2018, 2020).

Human resources can drive the development of the digital economy, especially in rural areas. A person is not required to perform routine operations but to search for a new, unconventional approach to solving professional problems. Evidently, anything that can be formalized and presented in the form of a certain algorithm will be done by machines and artificial intelligence. In turn, poorly structured problems should be the prerogative of natural intelligence—humans. Only the cooperation between artificial and natural intelligence, rather than confrontation, allows building a qualitatively new economic development model. It is no coincidence that there are discussions about the coming structural shifts in the labor market and the search for in-demand professions and key competencies of the future workers. The success of society's transition to Industry 4.0 will largely depend on the skills and abilities of employees involved in the digital transformation. (Kanke et al., 2021; Morozova et al., 2020).

Most researchers believe that a modern education system should be more than just a translator of knowledge or a tool for transferring a certain data set in different directions. This role loses relevance with the widespread use of the Internet as a unique learning and cognitive environment. The World Wide Web allows us to save time searching for necessary information. The search engine provides many links to the material of interest, eliminating the need to visit libraries. Evidently, the Internet does not produce but only accumulates knowledge; it is a kind of infrastructure facilitating the access and exchange of knowledge. Just as a good road will give us a comfortable ride, so will the Internet make the learning process quick and convenient. The education system should integrate the Internet and information technology into the learning process, not competing or rejecting it. Cooperation is the general line of the development of education in the digital economy.

The development of the education system has been the focus of the world community for quite a long time. Thus, at the 70th session of the UN General Assembly, the document "Transforming our world: the 2030 Agenda for Sustainable Development" proclaimed key Sustainable Development Goals (SDGs), which included the development of education (SDG 4). It acts as a kind of catalyst and contributes to the growth of people's well-being. Education can contribute to a new vision of sustainable global development and the implementation of the proclaimed SDGs. This message was the key message of the event (Fig. 20.1).

The need to modernize the education system was discussed at the 2015 World Education Forum, which adopted a framework program "Incheon declaration." This program contains a new vision for education until 2030, the implementation of which

	Sustainable Development Goals
Education	Reduces poverty and increases income (SDGs 1, 4, and 8)
	Leads to improved health (SDGs 2, 3, and 6)
	Prevents inequality and promotes social justice (SDGs 5, 10, and 16)
	Promotes sustainable economic growth (SDGs 9 and 11)
	Helps protect the planet (SDGs 7, 12, 13, 14, and 15)
	Causes the need to develop partnerships (SDG 17)

Fig. 20.1 Model of the relationship between educational development and the implementation of the SDGs. *Source* Compiled by the authors based on (UN General Assembly, 2015)

will contribute to the achievement of the global Sustainable Development Goals (UNESCO, 2015).

The UNESCO Institute for Statistics (UIS) introduced the e-Atlas for Education 2030, which systematized information to monitor the SDG on education (SDG 4) (UNESCO, n.d.).

We can also mention the study of American scholars Frey and Osborne dedicated to changing the American labor market in existing professions by 2035 under the wiggle of automation and digitalization (Tinyakova et al., 2018).

As a result of this research, scholars have identified three key competencies that will be most demanded in the future society, and that will allow preserving traditional professions (Fig. 20.2):

- Communication competencies;
- People management competencies;
- Creative competencies.

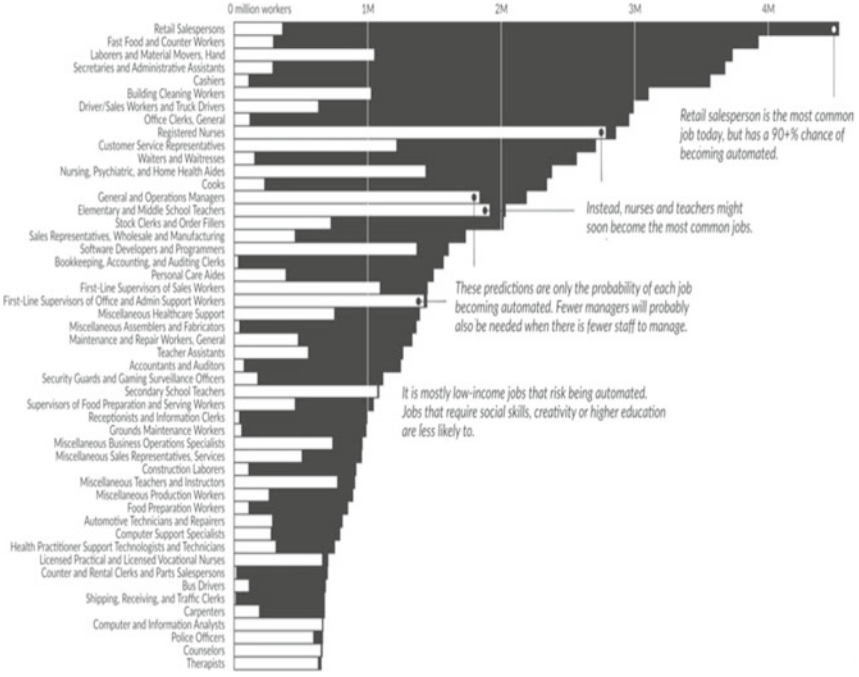
Similar studies are conducted in Russia. For example, there is a university of the future "National Technological University 20.35." This university offers a new model of educational activities based on digital platforms and a network of universities (20.35 University, 2017).

Thus, the interest of scientists in the search for the most demanded competencies in the digital economy and the analysis of structural shifts in the labor market is significantly increasing.

In the context of the transformation of the education system, categories such as "qualification," "competence," and "professionalism" begin to play a key role. Understanding the essential features of these categories will determine the possibility of a qualitative and quantitative assessment of training and the demand for future specialists.

Qualifications can be defined as the compliance of an employee with the requirements for a particular position. This category is partly formal in nature and designed to regulate the civil–legal relationship between the employee and the employer.

Competence is a wide range of professional and communicative requirements, which will be formed in educational institutions and directly in the workplace. Their



Note Black fields – areas of activity to be automated; white fields – activities that will remain a human prerogative.

Fig. 20.2 Model of structural shifts in the labor market in the digital economy. *Source* Compiled by the authors based on (Desjardins, 2017)

presence and degree of mastery will be measured by such an indicator as professionalism. In other words, professionalism comes with experience and is marked with the employee's ability to apply the knowledge received during their education practically. The growth of professionalism will promote the employee's career and show his or her demand in the labor market. Using Euler circles, Fig. 20.3 shows a graphical interpretation of the relationship between the categories "professionalism," "proficiency," and "competence" (Tinyakova et al., 2018, 2019).

In our opinion, the goal of the learning process should be to form students' abilities to independently obtain the necessary knowledge during their professional activity, which is especially necessary for a rapidly changing external environment. We believe that the education system should form the competencies shown in Fig. 20.4. The possession of these competencies will allow one to stay in demand in the digital economy.

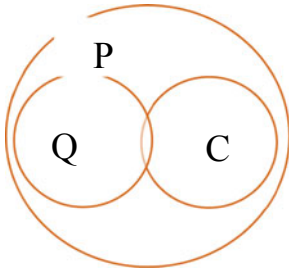


Fig. 20.3 Graphic model of the relationship between the categories of "professionalism," "qualification," and "competence." *Source* Compiled by the author

Note P – professionalism, Q – qualification, C – competence.

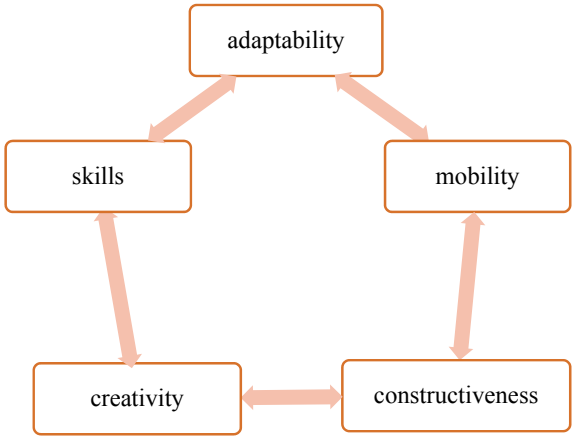


Fig. 20.4 Competencies formed by the education system in students and most demanded in the digital economy. *Source* Compiled by the author

20.4 Conclusion

Thus, global digitalization revolutionizes not only the economy but also education. Since it is impossible to build an innovative economy without personnel with the necessary competencies and skills, the level of education will determine the level of the population's well-being and the ability of society to achieve the SDGs.

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Chapter 21
A New Approach to Management in Higher Education Based on Operations Research for Sustainable Development

Olga V. Konina

JEL Codes G34 · Q01 · I21 · I23 · I25 · I26 · M14

21.1 Introduction

Sustainable development is the key to the future prosperity of humankind. Government efforts around the world aren't enough to fully implement these goals—it requires broad institutional involvement. The international study by PWC (2021) concluded that the degree of involvement of organizations in the implementation of sustainable development goals isn't high enough to expect the achievement of the intended results by 2030. Although 50% of organizations mention sustainable development goals in their corporate reporting indicating quantitative (20% in Russia) and qualitative (39% in Russia) benchmarks, only 8% report on the achievement of these parameters (less than 1% in Russia).

It's especially important for institutions in the higher education market to engage in the implementation of sustainable development goals, because this market, firstly, occupies an important place in the entrepreneurship system and is a vector of economic growth in the digital "knowledge economy" and, secondly, determines the implementation of the Sustainable Development Goals related to it (Goal 4: Quality Education). In addition, the focus on sustainable development will be included in the list of criteria for the national assessment of the effectiveness of universities and the compilation of international university rankings (for example, THE ranking) in the coming years.

All of the above determine the relevance of embedding sustainable development goals in management practices in higher education. The working hypothesis of this

O. V. Konina (✉)
Moscow State Pedagogical University, Moscow, Russia

E. G. Popkova and B. S. Sergi (eds.), *Digital Education in Russia and Central Asia*,
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study is that the directions of university management make significantly different contributions to the sustainable development of the higher education market, and operations research will allow selecting the most promising areas. Thus, the main purpose of this study is to develop a new approach to management in higher education based on operations research in the interests of sustainable development.

21.2 Literature Review

The theoretical basis of this study was formed by existing publications on sustainable development in education, in particular, the works of (Akopova et al. 2020; Galvão et al., 2020; Konina, 2020; Konina & Nanetadze, 2019; Leal Filho, 2020; Makar et al., 2019; Popkova et al., 2020; Saqib et al., 2020; Sozinova, 2020; Vanchukhina et al., 2019).

The literature review showed that the contribution of universities to sustainable development was studied mainly from the standpoint of public administration, while the scientific basis of corporate management in the interests of sustainable development in higher education hasn't been formed. Thus, this article is intended to fill the identified gap.

21.3 Materials and Methods

This article suggests using a new approach to management in higher education, which is based on operations research in the interests of sustainable development, involving corporate (internal) monitoring of the university's performance, relying on the hierarchical procedure of Saati (Saati method).

To form a scientific and methodological basis for the practical application of the new approach, this study collected and analyzed statistics on the implementation of various areas of university management (Table 21.1), and sustainable development of higher education from the standpoint of the human development index and academic reputation as an indicator of implementation (Goal 4: Quality Education), as well as the sustainable development index as an indicator of the implementation of a set of sustainable development goals (Table 21.2).

To obtain the most accurate, reliable, and useful application results, a special sample was formed, which includes 5 developed and 5 developing countries that hold the best (highest) positions in the ARWU university ranking in 2020. The study was conducted based on data relevant for the first half of 2021.

Table 21.2 calculated the maximum values of all indicators (maximum by columns) for subsequent calculations of the study.

Table 21.1 Statistics on the implementation of areas of university management in 2021 for a sample of developed and developing countries

Country category	Countries	Top universities according to ARWU university ranking	From the rating				From QS rating			IMD
			Number of students, thousand people	Number of students per teacher	Share of international students, %	Share of women, %	Faculty internationalization index, points 1–100	Citation index by faculty, points 1–100	Reputation as an employer, points 1–100	Robotization of science and education, positions 1–63
Developed	The USA	Harvard University	21.261	9.3	25.0	46.0	85.2	99.1	100.0	3
	The UK	University of Cambridge	19.370	11.0	38.0	47.0	100.0	69.2	100.0	6
	France	Paris-Saclay University	28.618	14.6	16.0	55.0	35.1	23.9	9.4	5
	Switzerland	ETH Zurich	19.632	13.1	40.0	32.0	100.0	96.4	96.6	15
	Canada	University of Toronto	74.502	20.0	22.0	59.0	97.9	45.8	96.8	9
Developing	China	Peking University	38.583	11.1	16.0	43.0	55.3	83.2	98.6	1
	Russia	Moscow State University	28.525	8.4	32.0	52.0	20.1	7.4	82.8	8
	Saudi Arabia	King Abdulaziz University	31.869	7.8	22.0	54.0	99.0	80.2	52.4	54
	Brazil	University of Sao Paulo	82.961	16.1	4.0	47.0	8.2	38.1	67.4	14
	Chile	University of Chile	36.433	15.4	6.0	48.0	9.5	15.0	91.2	46

(continued)

Table 21.1 (continued)

Country category	Countries	Top universities according to ARWU university ranking	From the rating				From QS rating			IMD
			Number of students, thousand people	Number of students per teacher	Share of international students, %	Share of women, %	Faculty internationalization index, points 1–100	Citation index by faculty, points 1–100	Reputation as an employer, points 1–100	Robotization of science and education, positions 1–63
Maximum			82.961	20.0	40.0	59.0	100.0	99.1	100.0	54

Source compiled by the author based on materials from (IMD, 2020; ARWU, 2021; QS, 2021; THE, 2021)

Table 21.2 Statistics of sustainable development of higher education in 2021 for a sample of developed and developing countries

Category	Countries	Academic reputation, points 1–100	Sustainable development index, points 1–100	Human development index, points 1–100
Developed	The USA	100.0	76.43	0.920
	The UK	100.0	79.79	0.920
	France	18.1	81.13	0.891
	Switzerland	98.7	79.35	0.946
	Canada	99.3	78.19	0.922
Developing	China	98.2	73.89	0.758
	Russia	77.3	71.92	0.824
	Saudi Arabia	36.3	65.85	0.857
	Brazil	88.6	72.67	0.761
	Chile	73.9	77.42	0.847

Source compiled by the author based on (QS, 2021; UN, 2021; World Population Review, 2021)

21.4 Results

To form a scientific and methodological basis for a new approach to management in higher education based on operations research in the interests of sustainable development and based on data from Tables 21.1 and 21.2, a correlation analysis of the directions of university management and sustainable development of higher education is carried out in Table 21.3, and the weight coefficients for each direction of management are calculated (as a ratio of the correlation coefficient to the sum of the row).

Table 21.3 negative correlation coefficients (for all indicators, except for robotization, because less is better, as the value is measured locally) indicate the absence of a contribution of the direction of management to the sustainable development of higher education—they have been assigned zero weight coefficients. For example, the correlation between the number of students and academic reputation in developed countries was 0.09. The amount in the line is 3.46. The weighting factor for the number of students is calculated as follows: $0.09/3.46 = 0.03$. The approbation of the new approach on the example of the United States and Russia is presented in Table 21.4.

In Table 21.4, the ratio of values from Table 21.1 to the maximum is determined for each country; for example, in Russia, the number of students in 2021 is 28.525, and the maximum is 82.961, i.e., $28.525/82.961 = 0.34$. Next, weighted sums are calculated: the product of values relative to the maximum with weighting factors for the corresponding category of countries (from Table 21.3). In Russia, the weighted sum for the number of students is calculated as follows: $0.34*0.16 = 0.06$.

Table 21.3 Correlation analysis of directions of university management and sustainable development of higher education and calculation of weight coefficients

Category of countries	Management efficiency criterion from the standpoint of sustainable development	Number of students	Number of students per teacher	Share of international students	Share of women	Faculty Internationalization Index	Citation Index by Faculty	Reputation as an employer	Robotization of science and education	Line amount*
Correlation, shares of 1										
Developed	Academic reputation	0.09	−0.14	0.65	−0.38	0.97	0.74	1.00	0.30	3.46
	Sustainable Development Index	−0.17	0.20	−0.01	0.06	−0.51	−0.63	−0.69	0.20	0.26
	Human Development Index	−0.07	−0.09	0.80	−0.74	0.86	0.78	0.81	0.74	3.25
Developing	Academic reputation	0.40	0.51	−0.32	−0.86	−0.65	−0.19	0.75	−0.84	2.50
	Sustainable Development Index	0.14	0.71	−0.52	−0.67	−0.79	−0.52	0.83	−0.29	1.96
	Human Development Index	−0.64	−0.38	0.33	0.80	0.29	−0.24	−0.34	0.82	1.42
Weight coefficient, fractions of 1 (the sum of the weight coefficients in the row is equal to 1)										
Developed	Academic reputation	0.03	0.00	0.19	0.00	0.28	0.21	0.29	0.00	1.00

(continued)

Table 21.3 (continued)

Category of countries	Management efficiency criterion from the standpoint of sustainable development	Number of students	Number of students per teacher	Share of international students	Share of women	Faculty Internationalization Index	Citation Index by Faculty	Reputation as an employer	Robotization of science and education	Line amount*
	Sustainable development index	0.00	0.76	0.00	0.25	0.00	0.00	0.00	0.00	1.00
	Human development index	0.00	0.00	0.25	0.00	0.26	0.24	0.25	0.00	1.00
Developing	Academic reputation	0.16	0.20	0.00	0.00	0.00	0.00	0.30	0.34	1.00
	Sustainable development index	0.07	0.36	0.00	0.00	0.00	0.00	0.42	0.15	1.00
	Human development index	0.00	0.00	0.23	0.56	0.20	0.00	0.00	0.00	1.00

* Only positive correlation coefficients for the first 8 rows and only negative values for the last row are summed up, multiplied by −1

Source Calculated and compiled by the author

Table 21.4 Assessment of the effectiveness of management in higher education in the United States (as a developed country) and Russia (as a developing country) in 2021

Country	Management efficiency criterion from the standpoint of sustainable development	Number of students	Number of students per teacher	Share of international students	Share of women	Faculty Internationalization Index	Citation Index by Faculty	Reputation as an employer	Robotization of science and education	Hierarchical synthesis
Values relative to the maximum										
The USA	–	0.26	0.47	0.63	0.78	0.85	1.00	1.00	0.06	–
Russia	–	0.34	0.42	0.80	0.88	0.20	0.07	0.83	0.15	–
Weighted amounts (taking into account the weights for the respective category)										
The USA	Academic reputation	0.01	0.00	0.12	0.00	0.24	0.21	0.29	0.00	0.87*
	Sustainable development index	0.00	0.35	0.00	0.19	0.00	0.00	0.00	0.00	0.55*
	Human development index	0.00	0.00	0.15	0.00	0.22	0.24	0.25	0.00	0.87*
	Column sum	0.01	0.35	0.27	0.19	0.46	0.45	0.54	0.00	2.28**
Russia	Academic reputation	0.06	0.09	0.00	0.00	0.00	0.00	0.25	0.05	0.44*
	Sustainable development index	0.02	0.15	0.00	0.00	0.00	0.00	0.35	0.02	0.55*
	Human development index	0.00	0.00	0.19	0.49	0.04	0.00	0.00	0.00	0.72*

(continued)

Table 21.4 (continued)

Country	Management efficiency criterion from the standpoint of sustainable development	Number of students	Number of students per teacher	Share of international students	Share of women	Faculty Internationalization Index	Citation Index by Faculty	Reputation as an employer	Robotization of science and education	Hierarchical synthesis
	Column sum	0.08	0.24	0.19	0.49	0.04	0.00	0.60	0.07	1.71**

*Amount per line

**The sum of the above three values

Source Calculated and compiled by the author

In general, the most effective areas of management in higher education in the USA from the standpoint of sustainable development turned out to be reputation as an employer (0.54), internationalization of faculties (0.46), and citations by faculty (0.45). In Russia: reputation as an employer (0.60) and proportion of women (0.49).

In the USA, the contribution of all areas of management to academic reputation and human development was 0.87, to sustainable development—0.55, in aggregate (hierarchical synthesis—sum): 2.28 (0.87 + 0.87 + 0.55). In Russia, the contribution of all areas of management to human development was 0.72, to sustainable development—0.55, and to academic reputation—0.44, in aggregate (hierarchical synthesis—sum): 1.71 (0.72 + 0.55 + 0.44), i.e., 25% less than in the USA.

21.5 Conclusion

The developed new approach to management in higher education based on operations research in the interests of sustainable development allows for the internal monitoring of the performance of universities, which is also based on the main indicators, according to which universities have already been conducting statistical records. The new approach has several advantages:

Allows separately assessing each direction of management, i.e., provides high detail—if it's necessary;
Takes into account the specifics of developed and developing countries, giving corresponding (different) weight coefficients for them;
Allows combining high-quality (three management priorities: contribution to academic reputation, human development, and sustainable development) and high-quality (based on the operations research methodology with the calculation of weighted sums and hierarchical synthesis) management tools in the interests of sustainable development, fully embedding the goals of sustainable development in the strategy of universities.

Thus, a new approach to management in higher education based on operations research allows universities to achieve high management flexibility in the interests of sustainable development. Approbation of the developed approach showed that in the USA the effectiveness of management from the standpoint of sustainable development is 2.28 and in Russia—1.71. In both countries, the efficiency is high (because it exceeds 1), but it can be increased through the development of the most promising areas—this is an improvement in the reputation of universities as employers.

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Part III
Advantages of Digital Higher Education for the Labour Market Optimization and Employment of Youth in Central Asia and Russia

Chapter 22
The Role of Universities in Building Citizens' Competencies Required for E-Participation

Irina V. Pogodina, Galina V. Stankevich, and Danila A. Avdeev

JEL Codes A22 · I28 · K23

22.1 Introduction

Currently, one key trend, which is reflected in all spheres of life, is the use of digital technologies.

Digital technologies such as the Internet and social media are changing traditional concepts of citizen participation in public administration. These technologies have made it possible to overcome the limitations of physical participation in terms of time and distance. For example, making decisions no longer requires citizens to be at a single location. Governments around the world are increasingly implementing e-participation platforms to engage citizens in consultation and decision-making processes (Rexhepi et al., 2018). A positive effect from the work of platforms is achieved when they work for a sufficiently long time (Naranjo-Zolotova et al., 2019) and under the condition of constant and active participation of citizens in their activities, as well as the use of their services.

Citizens' participation in e-government is variable and limited by various circumstances. Despite the existence of studies on e-participation factors, only a few of them take into account the fact that some citizens participate in e-co-government while others don't. The problem of civic absenteeism in public life is acute: citizens don't always use the tools of e-participation offered (created) by the authorities; moreover, their use isn't always constant, and even more so actively.

I. V. Pogodina (✉) · D. A. Avdeev
Vladimir State University, Vladimir, Russia

G. V. Stankevich
Pyatigorsk State University, Pyatigorsk, Russia

E. G. Popkova and B. S. Sergi (eds.), *Digital Education in Russia and Central Asia*,
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To find a systemic solution to this problem, a culture of participation should be formed to popularize various forms of co-management offered to citizens. A significant role in the process of shaping a culture of participation, the formation of an active citizen, and, as a result, a modern civil society, belongs to educational institutions, among which universities are of particular importance.

In this article, the authors examine the role of universities as the main actors shaping the competencies required for e-public participation.

In recent years, the concept of e-participation has been studied by various scientists and international organizations (Sæbø et al., 2008).

Over the past two decades, governments at all levels (federal, state, and local) have widely adopted e-democracy technologies to provide e-participation opportunities, as well as online information and services (Coursey & Norris, 2008; Lee-Geiller & Lee, 2019; Macintosh, 2004), hoping to increase the rate of participation of citizens in public affairs (Choi & Changsoo, 2020).

All of the researches show that young people have developed technical skills at a high level; however, they rarely use the Internet as a platform for public participation (Lozano-Díaz & Fernández-Prados, 2018). Students generally show a low level of development of active, critical, and political interaction on the Internet. Sociological surveys show that students aren't aware of the potential of the Internet as a tool for social activism. Hence, students often demonstrate no activity aimed at protecting human rights, preserving the environment, promoting social justice, etc. (Lozano-Díaz & Fernández-Prados, 2018).

The literature offers various technologies for the formation of competencies necessary for e-participation within university education. For example, conducting practical seminars, introducing game forms into the educational process, involving students in university management to form a "culture of participation," etc. (Lozano-Díaz & Fernández-Prados, 2018; Rexhepi et al., 2018; Sideri et al., 2019).

One of the ways to form competencies in the area of civic participation described in the literature is to conduct a special educational seminar. It was developed with due consideration of the UN Sustainable Development Goals until 2030 (hereinafter—the SDGs). Students were required to access various websites related to the SDGs and complete specific learning tasks with varying degrees of engagement (the options included reading the news, writing e-mails, petitions, etc.). The results are indicative because they demonstrate a marked increase in students' digital citizenship skills (Lozano-Díaz & Fernández-Prados, 2018).

Innovative forms and teaching methods, such as different games, are used to popularize the technologies of e-participation of youth in public administration. Game learning is used to engage young people, and to involve them in learning various aspects of sustainable design, as well as decision-making in a fun way (Rexhepi et al., 2018).

Rexhepi, Filiposka, Trajkovik described a methodology for involving young people in the design of public spaces through the use of a game approach (Rexhepi et al., 2018). The presented methodology improves educational activities to teach values, paradigms, concepts, and tools for increasing the sustainability of society. The authors concluded that electronic games that are used as a way of interaction

between young people and local governments can improve the decision-making processes.

Another important way of developing the competencies necessary for e-participation which is considered in the literature is associated with the involvement of students in the process of e-governance of their higher education institution. For example, the practice of using social networks to discuss issues of an educational institution significant for students is considered (Sideri et al., 2019).

The literature time and again repeats that the development of modern democracy—participatory democracy—and its forms should be accompanied by the formation of a culture of participation, an integral part of which is the citizen's awareness of responsibility for their actions (Usmanova, 2020). Methods of its formation are mentioned in an overview and not specifically (organization of control from below, discussion of local problems, contacts of the political elite with the population, etc.).

The Russian practice of the work of universities in the field under investigation hasn't been studied.

22.2 Materials and Methods

This section describes the data selected for the study, the methods that were chosen by the authors, and the analytical approach adopted.

As a methodological basis, a universal dialectical method of cognition and general scientific methods, such as analysis, synthesis, were chosen. The authors also used private scientific methods: formal-logical, system-structural, formal-legal methods.

In addition, an interdisciplinary approach was applied in this study, making it possible to consider the formation of e-participation skills from the point of view of different legal sciences and other areas of humanitarian knowledge. The issues of building an information society lie at the junction of several sciences, such as jurisprudence, computer science, philosophy, sociology, economics, etc.; thus, it's impossible to consider this process exclusively from only one point of view.

To solve the research questions posed, it seems necessary to use three types of sources: scientific publications (mainly articles included in the "Scopus" database), websites of state authorities, which have signs of public participation platforms, and university websites, federal educational standards of the latest generation (3++).

The research focus on the formation of the competencies of an active citizen for e-participation was made for the age group from 16 to 24 years (age of university studies). The choice of this category was based on the results of studies, according to which the Internet penetration is maximum among young people (close to the limit values), and is based on the hypothesis that representatives of this particular age group are potential users of Internet resources. Thus, the sample corresponds to the age characteristics of Internet users in Russia (other indicators, including gender, education level, profession, and income, weren't taken into account).

22.3 Results

"Cyber-Activism" is a form of social and political action; it focuses on the development of educational practices that promote involvement in public and political action on the Internet. This competence should be gradually formed at all training stages.

Previous studies in other countries have shown that educational attainment is positively correlated with civic engagement; interests in public affairs, voting, and participation in public affairs. Hence, higher education can have a serious impact on civic engagement (Saud, 2020).

Teaching the competencies of "digital citizens" at the university is important because universities are responsible for preparing their students to become active citizens in a democratic society (Zainon & Yau, 2017). After finishing study, graduates will become active participants in public life (Li & Zhao, 2018).

In the Russian Federation, the universal competence "civic position" has been introduced into the Federal State Educational Standards of Higher Education of the new generation (FSES HE), but it has a very narrow interpretation: the formation of an intolerant attitude toward corrupt behavior. It is clearly not enough for the formation of an active modern citizen—e-citizen.

"Citizenship through digital technologies" is one of the digital competencies proposed in the European Union report "The Digital Competence Framework for Citizens." Possession of this competence involves the ability to use various digital technologies, to expand opportunities for participation in society (EU Science Hub, 2017).

It is suggested that the following measures are taken for this formation in the higher education system (at universities):

(1) Introduce a course on civil society and modern forms of participation in public life;
(2) Conducting workshops, including in a playful way, to popularize platforms for public participation, elections (election campaigns);
(3) Creating forms of e-participation of students in the life of the university to form the habit of participation, communication skills, and to conduct master classes for citizens on the use of state sites;
(4) Attracting students for explanations, and training events for citizens on the possibilities of public authorities' platforms.

The introduction of a discipline on the interaction of civil society and the state (which can be called differently: "Active citizen," "Civic position," "State and civil society," etc.) should provide students with the knowledge of the definitions of the field, skills of working with electronic services of e-participation, and also, more importantly, form a habit of participating in solving state, regional, and local problems. This should help reduce political absenteeism and demonstrate that the development, as well as implementation of state policy, can't be successfully carried out without involving citizens, their groups, and associations in this activity.

Thus, the forms of interaction of civil society structures with the state in a modern country should be disclosed, the real domestic and foreign practice should

be analyzed, and students should be familiarized with the platforms for electronic voting, making decisions on issues of urban/local development, i.e., initiatives for citizen participation in public administration. Information and communication technologies should be used to conduct classes in the discipline, and, in particular, to form students' skills in using state Internet sites.

The introduction of the subject into the university vocational education program should become a tool for the formation of the universal competence of UC-10, and also a motivating factor for the use of the proposed participation tools.

22.4 Conclusion

E-participation of citizens in public administration can open up new opportunities for dialogue between the authorities and society. Since the use of most e-participation tools is voluntary, citizens should be highly motivated to actively use them. However, modern research shows that, despite the efforts of governments, citizens sometimes remain inert. To avoid this, it is recommended to increase citizens' interest in e-participation by creating a "culture of participation."

Universities as centers of concentration of young people should become the leading participants in this process. According to the authors, several measures described in the article should be taken to form the appropriate competencies among students: introducing an educational course dedicated to modern forms of participation in public life; organizing workshops for students; attracting students for explanations; and educational activities to citizens on the possibilities of public authorities' platforms. A culture of participation helps shape individual and collective identities; what is more, it is also an important asset that communities can develop for far-reaching benefits.

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Chapter 23
Innovative Policy for the Formation, Training, and Development of Management Personnel

Natalya A. Shibaeva, Elena A. Zbinyakova, Natalia I. Riabinina, Olga V. Kotlyarova, and Elena A. Bobrova

JEL Codes M12 · O3

23.1 Introduction

The regeneration of the processes of development of society toward openness and transformation of the conditions for the functioning of the external environment led to the establishment of new requirements for the personnel system. The personnel system, ensuring the distribution of the competencies of the subjects participating in it, determines the set of norms and rules required for the development of the modern system of society. At present, the personnel policy is limited to the establishment of staffing tables, the drafting of collective agreements and other legal documents, the formulation of internal regulations and personnel certification (Akimbekova, 2017). The highlighted actions are aimed at maintaining the current conditions for the functioning of personnel policy, but not at paying due attention to the aspects of the formation, training, and development of personnel.

The purpose of writing a scientific article is to work out the algorithms for the innovation policy of the formation, training, and development of management personnel.

N. A. Shibaeva (✉) · E. A. Zbinyakova · N. I. Riabinina
Orel State University, Orel, Russia

O. V. Kotlyarova
Vladimir Branch, The Russian Presidential Academy of National Economy and Public Administration, Vladimir, Russia
e-mail: ranepakotlyarova@yandex.ru

E. A. Bobrova
Orel State University of Economics and Trade, Orel, Russia
e-mail: lena-bobrova-orel@list.ru

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The objectives of the study are the following actions, which allow transforming this goal:

- To formulate the stages of the algorithm of innovation policy for the formation of management personnel;
- To determine the stages of the algorithm of the innovative policy of training management personnel;
- To group the stages of the algorithm of innovation policy for the development of management personnel;
- To establish indicators for assessing the innovation policy of the formation, training, and development of management personnel.

23.2 Materials and Methods

The study of the innovation policy of the formation, training, and development of management personnel, on the one hand, is associated with the study of the available scientific material, and on the other hand, is aimed at developing the author's proposals on this issue. Following the highlighted circumstance, the methodological aspect of the study consists of considering theoretical issues and forming the author's ideas on the topic of a scientific article. As a result of the presented conclusion, the following methods are used for writing this scientific article: theoretical knowledge (Akhmadullin, 2012), author's proposals (Holovach et al., 2019; Sinha et al., 2004), grouping data (Shipilova & Mkrtychev, 2020), delimiting aggregate circumstances (Diegtiar & Nepomnyashchyy, 2017; Lyapina et al., 2021; Stroeva et al., 2021; Stroeva et al., 2015).

23.3 Results

The innovative policy of personnel management is applied in various aspects of the manifestation of the essence and characteristics of this research topic. The innovative policy of personnel management is based on the introduction of transformational principles that allow changing the structure of this process, establishing new conceptual foundations or optimizing the personnel management system (Chavez–Pringle, 2021; Getha–Taylor, 2008). The development of an innovative policy of personnel management, as the main subject of research, began in the early 2000s and was based on a change in approaches to this process (Akimov, 2018; Sneed, 2007). The innovative policy of personnel management consisted in revising the role of the employee in the process of improving the activities of the territorial structure or business entities (Lovgren et al., 2002; Akimbekova, 2017). Today, the innovation policy produces new circumstances of personnel management, due to the development of a system for the formation, training, and development of employees (Gromyko, 2004). According to this feature, the key role of innovation policy is manifested through the use of

algorithms that allow establishing the elements of formation, training, and development of personnel management (Hinz, 2019). Based on this statement, the authors of the scientific study formulated algorithms for the innovative policy of formation, training, and development of personnel management, which can be applied within the framework of an integral system and separately from each other.

The managerial personnel reserve is one of the main tools to form a system of employees' potential for the short and long term. But in general, the formation of the personnel reserve of management is a fairly formal process. The declared applicant for the personnel management reserve may be inside it for an indefinite number of years, and as a result, not take the planned position. At the same time, the formation of personnel management is also an ambiguous process, which operates based on the level of education and work experience of the employee. A simplified presentation of the aspect of the formation of personnel management is due to the following measures:

1. Study of the needs for the transformation of the number of management personnel. This event is based on the analysis of the needs of the territorial management system in personnel, allowing implementing rather specific job functions. This need focuses on the need for the current formation of management personnel for the implementation of modern tasks and the definition of trends for long-term introduction—work on the personnel reserve of employees for positions that are planned to be opened in the long term.
2. Drawing up job requirements for management personnel. This specificity of the formation of management personnel consists in the formulation of instructions reflecting the main features of the work, and the necessary skills of the applicant. The basis of the allocated event is a feature connected, on the one hand, with the compliance of the personnel requirements of the modern system of legislation, and, on the other hand, with the ability to predict skills that form completely different approaches to management activities.
3. Establishing an information base through which applications from potential management personnel will be received. This event is based on online tools for obtaining information about a potential employee from the person applying for the position and from the employer. It also should be noted that today the establishment of information bases for the search for management personnel is given fairly strong importance on the part of the employer. In the opinion of the authors, this event, despite its importance, should not be a priority one.
4. Definition of systems for evaluating management personnel. The management personnel assessment system includes correspondence and face-to-face interviews, essay writing, and testing. The highlighted features regulate the formation of personnel management as a chaotic process, hiring a candidate in a regulated period. In simple terms, the selection of management personnel for the urgent filling of a vacant position. According to these features, the authors propose to use the algorithm of innovation policy for the formation of management personnel, which consists of three stages: conducting a qualified consultation; formation of a passport of competencies; unification of management personnel.

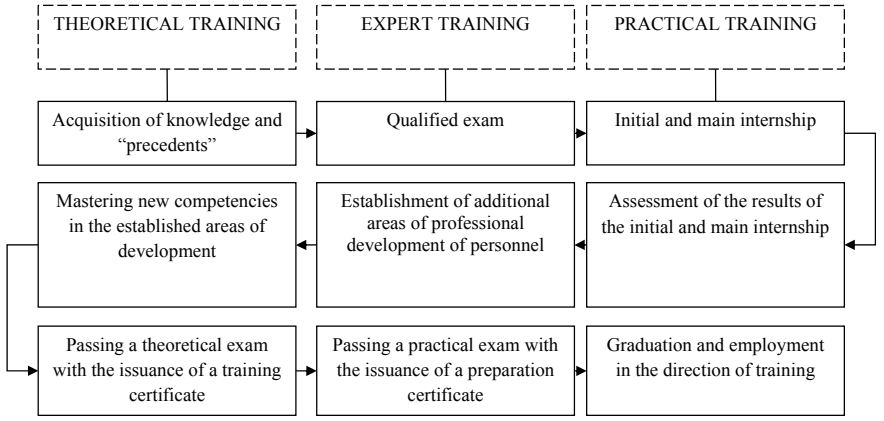

Fig. 23.1 Stages of the innovation policy algorithm for training management personnel. *Source* Compiled by the authors

This condition produced the importance of forming an algorithm for the innovative policy of training management personnel (Fig. 23.1). The stages of the innovation policy algorithm for training management personnel are focused on the theoretical, expert, and practical functions of transferring skills and competence in a bipolar direction: from theory to practice, and vice versa.

In general, it can be noted that the theoretical training of management personnel is associated with the acquisition of knowledge and the study of the "precedent." Of course, many scientists may disagree with the fact of studying the "precedent," stating a completely different regulatory and legal system operating on the territory of the Russian Federation. But in this case, the "precedent" does not refer to the legal regulation of aspects of public life in the Russian Federation. A "precedent" is a system of practical situations in the area of management, reflected in the framework of theoretical examples. By this fact, the "precedent" will allow consolidating the system of theoretical skills with examples of practical direction.

An expert assessment of the training of management personnel presupposes the consolidation of theoretical material. By the fact that within the framework of theoretical study it is proposed to use a system of "precedents," and expert training involves passing the exam to a greater extent, based on the assimilation of the material necessary for the internship. In the context of a qualifying examination conducted by an expert group, no marks are given to the trainer. The assessment base is aimed at determining the readiness/unavailability of the student to passing the internship system.

As part of practical training, internships are initial and basic. The initial internship gives an idea of the choice of the direction of the student's professional development. As part of the initial internship, which lasts for a month, the student undergoes vocational training in three selected areas. After completing the initial internship, the student independently decides on the need to acquire additional knowledge in a

specific direction of development and moves on to the stage of the main internship, which lasts about two months. After completing these internships, the expert group assesses the level of the student's professional competencies and forms a plan for additional development in the areas of professional activity.

After mastering new competencies in the context of theoretical training, the student takes a series of exams to consolidate knowledge in various areas of professional activity. The theoretical exam is aimed at assessing the mastered norms and rules of managing territorial entities. It should be noted that the theoretical exam is general and regulates the outlook of the student through the assessment of various areas of management. Compared to the final exam, which is taken by students of secondary vocational education or the higher education system, the theoretical exam has a fairly wide range of issues associated with the comparison of situations that appear in practice. In simple terms, management situations are imitated under the theoretical aspects of studying a specific issue. Passing the practical exam is based on the regulation of the skills acquired during the internship. The assessment of the practical exam consists of the analysis of working situations, the performance of tasks related to the paperwork, and orientation in the regulatory and legal area in the areas of work. Successful passing of the theoretical and practical exams confirms the high level of training of management personnel, within the framework of which the student is employed in the chosen specialty.

The aspect of the development of management personnel is quite interesting, which is based on refresher courses and professional retraining at the present day. Of course, one of the development tools can be considered in the system of development of management personnel. But at the same time, the absence of an algorithm for the development of management personnel reduces the importance of this tool (Table 23.1).

Based on Table 23.1, the algorithm for the development of management personnel is presented according to the differentiation of job groups: junior level, middle level, leader level. The presented differentiation is due to several factors. Firstly, within the framework of the algorithm for the development of management personnel, a single tool that affects all groups of positions cannot be proposed. By this conclusion, the development process involves not only the formation of methods aimed at improving the personality but also allowing assessing the current level of competence of management personnel. Secondly, the algorithm for the development of management personnel produces the importance of the assessment system, which makes it possible to develop a final strategy for the "need" of an employee in the general management environment. Under these prerequisites, the algorithm for the innovation policy of development of management personnel is based on the stage of proposals, additions, and evaluation, which allow making the simplest conclusion about the competent level of each of the employees. Let us consider the stage data based on job differentiation in more detail.

1. *Junior link*—this development process is regulated for specialists and consultants, who are the basis of the entry-level management system. It is planned to conduct a successful potential analysis and smart-testing for determining the

Table 23.1 Stages of the algorithm of innovation policy for the development of management personnel

Personnel management level	Stage of offers	Additional stage	Evaluation stage
Leader link	Embedding new tasks in the competence of the management team	Formation of proposals for optimization of tasks within the framework of project management	- Transfer to a related management position - Transfer to the middle management position - No transition - Retraining
Middle link	Proposal of block diagrams for solving problems in different areas of work	Proposal of block diagrams for solving problems in related areas of work	- Transfer to a related middle management position - Transfer to a managerial positio - Transfer to a junior-level position - No transition
Junior link	Success potential analysis and smart testing	Selection of the most competent directions for the development of management personnel	- Transfer to a related junior-level position - Transfer to a related middle management position - Advanced training within the framework of job duties

Source Compiled by the authors

level of junior managers. The analysis of the potential for success is based on the achievements that the employee in question has achieved during the period of work in a junior-level position. Smart-testing, on the contrary, involves the development of a matrix of potential opportunities depending on the knowledge and skills of the employee. Carrying out these activities, on the one hand, will allow choosing the most competent directions for the development of management personnel, and on the other hand, it will determine the professional level of the employee by the next stage of development: transition to a related position of junior or middle management, and training within the framework of the duties performed.

2. *Middle level*—this development process is regulated for the heads of sectors and departments, which are the basis of the middle-level management system. Compared to previous events, the development of middle management involves the implementation of greater emphasis on the current level of professional knowledge of employees. In the context of this foundation, middle-level workers are offered flowcharts for solving problems in areas of work and related areas of knowledge. Carrying out these activities is necessary to establish competencies in the areas of current work and determine the level of professional knowledge in related issues of management activities. The highlighted condition is produced

by the subsequent process of development of the middle management in the framework of the transition to the position of a junior (demotion) or managerial (promotion) composition.

3. *Leader link* development focuses on project management processes. This aspect is associated with the incorporation of new tasks into the system of professional activities of the management level, and also the use of project management for proposals in the area of optimization of their departments. As part of this development, it is proposed to get a transfer to a related management position or to carry out professional retraining.

In general, the main difference between the innovative policy for the formation, training, and development of management personnel from the existing one is an algorithmic approach, which is based on all components of training and assessment of these subjects. It can be noted as a comparison that in modern conditions the formation of management personnel is based only on the system of inclusion in the reserve, according to formal and obscure principles of selection for certain positions. Personnel training is implemented in the system of secondary vocational or higher education, differentiating into the presence of additional competencies only within the framework of postgraduate education systems. The development of management personnel is based on the passage of refresher courses or professional retraining. But at the same time, there is no assessment of management personnel in terms of professional competencies for the implementation of the possibility of advancement in the "career lift."

The assessment system plays an important role in obtaining the results of the innovative policy of formation, training, and development of management personnel. So, the presented algorithms of the innovation policy of formation, training, and development of management personnel are determined within the framework of the level assessment of the result of this activity:

1. *Assessment of the formation of management personnel*:

$$p_f = \frac{u_d \times u_n}{u_p}, \tag{23.1}$$

where p_f is the assessment of the formation of management personnel, u_d is the level of achievements of the candidate considered for the management personnel, u_n is the level of initial competencies of the candidate considered for the management personnel, and u_p is the level of development of the candidate obtained by the passport of competencies.

2. *Assessment of management training*:

$$p_p = u_t \times u_e \times u_r, \tag{23.2}$$

where p_p is the assessment of management personnel training, u_t is the level of achievements in the area of theoretical mastering of the material (30%), u_e is the level

of achievements in the area of expert advice (25%), u_r is the level of achievements in the framework of practical activities, including internships (45%).

3. *Assessment of the development of management personnel*:

$$p_k = u_v \times u_k, \tag{23.3}$$

where p_k is the assessment of the development of management personnel, u_v is the level of proficiency in professional competencies, u_k is the test assessment of the possession of the case material (as a percentage).

The indicator for assessing the formation of management personnel is associated with the aspect of changes in the level of competencies of the subject under consideration. In simple terms, the assessment of the process of formation of management personnel allows you to compare the achievements of the subject at the beginning of the study with the final results. Assessment of management training focuses on achievements in the development of theoretical training, expert advice, and internships. By the assessment of personnel training, an important condition is entering the planned range based on mastering the material: 30%—theoretical training, 25%—expert advice, 45%—practical activities. Assessment of the development of management personnel is also predetermined by analyses of the level of professional competencies of an employee.

In general, the innovation policy of formation, training, and development of management personnel in this study is considered in the context of creating an algorithm, which is the structural basis of these processes. The developments, which were presented by the authors, do not state the regulation of their opinions as to the only correct ones. An innovative policy for the formation, training, and development of management personnel is one of the links in the educational and personnel training of workers in the sphere of state and municipal government. This study is the basis for a systematic analysis of the implication of the potential of personnel management for solving problems of a municipal and regional nature.

23.4 Conclusion

The conducted research on the topic of innovation policy for the formation, training, and development of management personnel focused on the following conclusions.

1. Today, the process of formation, training, and development of management personnel is formalized, having general principles for building an educational system related to other professions. In simple terms, the aspects of the formation, training, and development of management personnel do not differ from other spheres of the country's economy. "Point" skills of professional competencies and management personnel can be obtained only in the system of additional education. This condition states the fact that there are no special algorithms for

innovation policy for the formation, training, and development of management personnel.

2. The stages of the innovation policy algorithm for the formation of management personnel are a system of selection of subjects based on the manifestation of achievements and the acquisition of new knowledge within the framework of the association of management personnel. The innovative policy of personnel formation does not deny the principle of the personnel reserve, but at the same time imposes more complicated requirements for inclusion in it. In general, the innovative policy for the formation of management personnel is based on the analysis of the candidate's achievements, the development of skills, and the assessment of competencies.
3. The stages of the algorithm for innovative training of management personnel expand the understanding of educational activities in this area. It is proposed that the training of management personnel is based on three stages: theoretical, expert, and practical. The theoretical stage of preparation is based on the assimilation of theoretical materials and the development of "precedents." A practical situation generalized based on theoretical conclusions is considered as a precedent. The expert stage involves the formation of an assessment block for mastering the theory for the implementation of management personnel in the process of internships, which are a key practical event in this system.
4. The stages of the algorithm of innovation policy for the development of management personnel provide for paying special attention to the assessment of the personality. In the con text of this algorithm, itis proposed to divide measures for the development of management personnel by the types of positions: junior, middle, and leader levels. This feature will allow differentiating the requirements for management personnel and focusing attention on their professional competencies.
5. Evaluation of the results of innovation policy is necessary to obtain results in the process of formation, training, and development of management personnel. For the simplicity of the study, three indicators have been developed, giving an idea of the manifestation of the achievements and professional skills of management personnel. The highlighted tool is quantitative. In turn, the developed indicators can become the initial link for the development of a modern system of indicators for assessing the formation, training, and development of management personnel.

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Chapter 24
Preparing Students for Work in the Context of the Digital Integration of the Economy

Elvira K. Samerkhanova, Elena P. Krupoderova, Klimentina R. Krupoderova, Lyudmila N. Bahtiyarova, and Alexander V. Ponachugin

JEL Code I230

24.1 Introduction

The beginning of the twenty-first century is a time of active changes in the economic, political, and social spheres, a time of unprecedented technological inventions and integration processes. The rapid spread of digital technologies, their penetration into all spheres of life, the large-scale changes they entail, and at the same time the uncertainty with the consequences to which they can lead require the attention of professional communities and joint efforts of research scientists from various countries.

All companies whose business concept is primarily based on digital business models such as software or the Internet are considered part of the digital economy. The basis for the active formation of digital changes is a good education in order to acquire additional digital skills, support of network universities, and research institutes.

Digital maturity in organization is related to its ability to use technology for professional and administrative purposes. At the university, this applies to teaching, planning, assessment, communication, resource sharing, student management, reporting, etc. Digital maturity is important for the successful implementation and safe use of digital technologies in the educational process.

E. K. Samerkhanova (✉) · E. P. Krupoderova · K. R. Krupoderova · L. N. Bahtiyarova · A. V. Ponachugin
Minin Nizhny Novgorod State Pedagogical University, Nizhny Novgorod, Russia

A. V. Ponachugin
e-mail: sasha3@bk.ru

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The program "Digital Economy of the Russian Federation" (2019) is aimed at solving problems, including providing the digital economy with competent and competitive personnel (The passport of the national program "Digital Economy of the Russian Federation", 2019).

The formation of such competencies, in our opinion, is most effective within the framework of basic professional educational programs (BPEP), because it is during the development and implementation of educational programs that conditions are created for building an optimal curriculum, taking into account the requests of employers; selection of forms and methods of organizing educational and extracurricular activities; development of methodological support for disciplines and practices, including in the electronic environment of the university; organization of research activities of teachers and students.

The authors consider the substantiation of ways to form competencies of the digital economy within the framework of BPEP as a scientific and practical task.

24.2 Methodology

Perevoschikova, Samerkhanova, and Balaki discuss technological and socio-economic challenges to the education system, approaches to the allocation of competencies and skills of the digital economy and their ranking in their works (Perevoschikova, 2020; Samerkhanova & Balakin, 2020). The interaction of participants in the educational process in a digital educational environment is considered in the works of Samerkhanova, Bahtiyarova, Krupoderova, Krupoderova, and Ponachugin. The authors emphasize that an economy based on digital technologies requires the transformation of production and the social sphere and specialists with new competencies. Some authors believe that a modern specialist should have digital literacy, the ability to master different foreign languages, motivation for lifelong learning, and readiness for labor migration (Samerkhanova et al., 2020c).

There are many approaches to identifying the competencies that are most important for the digital economy. Let's keep the focus on three of them. The following competencies were named at the World Economic Forum in the report "The Future of Jobs": complex problem-solving, critical and creative thinking, human resource management, social communication, emotional intelligence, development and decision-making, customer focus, negotiation, and ability to learn new things.

The proposed model lacks digital skills. All of these skills can be attributed to the group of behavioral competencies, the role of which is increasing in the digital transformation of society, because they are the most difficult to automate and robotize.

The second approach to the competencies demanded by the digital economy implies the presence of both behavioral and digital skills. One of the competency models, which include cognitive, socio-behavioral, and digital skills at the same time, was presented in the report (Russia 2025: From Personnel to Talents, 2017). This report was written by the consulting company BCG.

Digital skills are considered in the third approach. A model for assessing the digital literacy of the population by five indicators was proposed at the G20 summit, which was held in 2017 in Berlin. The NAFI Analytical Center announced the results of measuring the level of digital literacy of the population, presented in the form of an index of digital literacy for Russians in general and for individual social groups, based on this model in 2018. The results of the study showed a high level of digital literacy among 45% of Russians; literacy remains at low level among a quarter of the population.

The developers of the concept of the basic competence model of the digital economy analyzed the competence models of various large companies, on the basis of which the key competencies of the digital economy were determined (Order of the Ministry of Economic Development of the Russian Federation, 2020).

The possibility of forming the competencies of the digital economy within the framework of BPEP has been substantiated. It is shown that the use of the capabilities of the digital educational environment, the use of classroom and extracurricular project activities, starting with the junior undergraduate courses, are necessary to form competencies. The analysis of various digital tools that can be useful in the formation of each of the competencies has been carried out.

24.3 Results

An appropriate digital educational environment should be created for the formation of key competencies of the digital economy at the university. The structure of the digital educational environment of the university, including for the implementation of educational programs, is substantiated in the works (Gruzdeva & Bakhtiyarova, 2014; Gruzdeva, 2019).

The article (Samerkhanova & Imzharova, 2017) presents a model of a unified electronic platform for managing educational programs at the university. We believe that it is possible to track the success of the formation of key competencies using the services “Map of personal and professional development of students” and “Student portfolio”.

The article is devoted to the analysis of the capabilities of cloud services for building a digital environment for an educational program. Digital tools for creating content, collecting and processing information, organizing project and research activities of students, their network co-operation and carrying out reflection are presented. Let us consider the possibilities of these tools for the formation of key competencies of the digital economy (Bryksina & Krupoderova, 2016).

Revealing the potential for the implementation of the project method by means of digital technologies will allow to expand its impact on the formation of professional competencies of future specialists (Samerkhanova et al., 2020a).

Information skills are more important than ever before. The need to form the competence “information and data management” in each discipline of the educational program is beyond doubt. The skills of determining the optimal amount of

information, searching for available information channels, finding out how accurate the information is, whether it is possible to interpret it, etc. are necessary when solving any problem. Competent use of digital tools for searching, processing, presenting information in various forms (text, numerical, graphic, multimedia) is required.

The connection between the competence «information and data management» and the information culture of students is obvious. It is necessary to systematically work on the formation of the information culture of students, on teaching the skills of determining high-quality information resources, assessing their reliability, scientific character, and relevance.

At the same time, the digital educational environment of each discipline should be filled with high-quality, methodologically sound content.

Let us give examples of tasks for the formation of the competence "information and data management" within the framework of the "Information technology" module, which is conducted for first-year students of Minin University. Students carry out the classification of information resources according to the form of information presentation in the discipline «World information resources». According to this classification method, all information resources are divided into undocumented and documented. Documented information resources are divided into text, graphic, photo, audio, video, and electronic documents. Students are invited to perform a classification of documented information resources presented in the world digital library https://www.wdl.org/ru.

Students use digital tools such as co-authoring hypertext services, on-line questionnaires, on-line memory cards, infographics, etc. performing tasks for data search, their classification, presentation in different formats. Let us give examples of the use of these tools by future graduates of the "Information Systems and Technologies" program. The development of these information products by students contributes to the formation of the competence "information and data management". Examples of information products are as follows:

– on-line time tape "Information revolutions" (https://clck.ru/Tgeiy), service https://time.graphics;

– on-line interactive whiteboard "Recommendations for Internet Security" (https://clck.ru/Kh2Ub), service https://padlet.com;

– a survey using a Google form to identify the impact of information technology on human life (https://clck.ru/SdCEs) and analysis of survey results using a wiki article (https://clck.ru/SdBub).

Let us consider the competence «critical thinking in the digital environment». Scientists conclude (Paul & Elder, 2006) that people with critical thinking are ready to solve problems, set deliberate goals, inquisitive, ready to correct mistakes, good listeners, make compromises, and tolerant.

The development of critical thinking is at the heart of the mission of the education system. The main tasks of the university are the development of media and information education, contributing to the expansion of the worldview of students, autonomous and critical thinking.

The fundamental attitudes that characterize it and the way of realizing the critical spirit are understood as "critical thinking". The connection between these two aspects is critical in education because practice builds the ability to think critically.

Students come to the university with a certain amount of preconceived ideas, gained from their experience or study of various sources, especially from the Internet. The challenge for the university is to give them the intellectual tools, to challenge these biases and overcome them. Students receive solid theoretical and methodological training, but less often the practice itself, for this.

For example, one of the tasks in the discipline "World Information Resources" is associated with the analysis of sites for the reliability and accuracy of the information provided, while students need to choose the appropriate methods for assessing sites.

Using various visualization techniques such as clusters, fishbone diagrams, SWOT analyzes, cause-and-effect maps, denotational graphs, etc. are useful for developing students' critical thinking. The service https://miro.com was used as an example of the SWOT analysis "Information on the Internet as a global phenomenon" (https://clck.ru/T43Xq).

The "creative thinking" competency is an invaluable skill for students. This is important because it helps to look at problems and situations from a new perspective. Forming this mindset is a way of developing new or unorthodox solutions that do not depend entirely on past or current decisions. This is a way to use strategies for reasoning and ideas beyond the current framework.

Creative (original) thinking is also called lateral thinking, which means using another parallel path instead of the main one, which changes the vision of the situation and allows thinking differently, without the barriers that we usually create ourselves.

The use of the project method is perfect for the development of creative thinking. For example, the project "Towards an Information Society" is carried out in the discipline "Informatics" annually. Students are divided into groups and work together on the university wiki site, answering one or another problematic question. Let us consider some information products from this project: wiki report of a group dealing with the prospects for Russia's entry into the information society (https://clck.ru/Safhx); on-line timeline with the main laws, projects, and programs for the development of the information society in Russia (https://time.graphics/line/440637); on-line presentation "Scientists who developed the concepts of the information society" (https://clck.ru/SdC5z); on-line mental map of opportunities and risks of the formation of an information society in Russia (https://clck.ru/SauZS).

The formation of the "communication and cooperation" competence provides the development of team interaction skills and leadership strategies in various areas of activity to ensure the effectiveness of problem-solving. A variety of digital tools that allow students to interact and collaborate can be used to build competence. Some of them are described in the manual (Samerkhanova et al., 2020b).

Table 24.1 shows examples of students' joint activities in a digital educational environment.

The "self-development in conditions of uncertainty" competence presupposes a person's desire to think and make decisions independently. In our opinion, this competence is inextricably linked with the readiness for lifelong learning throughout

Table 24.1 Examples of joint activities

Example of joint activities of students	Digital instruments
Selection and annotation of Russian Internet services	Google-table https://clck.ru/TCrCT
Collective wiki-encyclopedia of Russian informatics	Article on the university wiki site https://clck.ru/Jg6DQ
Creation of a joint presentation "Our favorite information resources"	Google-presentation https://clck.ru/TCqwD
Collecting guidelines for ethical online behavior	Interactive on-line whiteboard https://clck.ru/SdBub
Collective timeline "History of the Internet"	Service https://www.timetoast.com https://clck.ru/T2jca

Source Compiled by the authors

life. Such readiness should be formed among students within all disciplines of the educational program, in practice, in the framework of research activities.

The modern student has a large number of opportunities for self-development. A person investing in self-development must have a clear vision of the goal and be attentive to emerging opportunities. He must have a strategic life plan and act creatively and innovatively.

Thus, self-development means independently contributing to the intellectual growth acquired through training in various areas of life. This concept is often used in a marketing context, as self-development allows for new entrepreneurial commitments and new job opportunities.

Self-development should be a continuous process and organized in several stages. The subject's action is built on the basis of interaction with the environment in which it takes place, to which he gradually adapts in order to consolidate and improve his position.

The concept of self-development implies a form of belief in the potential of people and in the ability to make changes by improving their sense of existence and their actions.

Purposeful work on the formation of this competence in students contributes to the development of all other competencies, adaptation in further professional activity.

One of them is the possibility of obtaining additional competencies through massive open on-line courses.

Students develop a model of a personal information environment, using on-line tools for building memory maps, in the discipline "Informatics". The model includes software, Internet services, information resources for study, communication, self-development, entertainment, shopping and payments, etc. At the same time, attention should be paid to the licensing of the software. Many students show electronic libraries, massive open online courses, sites for programmers, and sites for various competitions and projects in their models. Teachers draw the attention of students

to the fact that the model will constantly expand during their studies and professional activities. Example of task: https://clck.ru/T8uZh. Service used https://www.mindomo.com.

It is necessary to carry out both educational work and extracurricular activities to form competence in self-development. For example, student programming hackathons are held annually for future bachelors of the "Information Systems and Technologies" program.

For example, the participating teams were asked to develop a project for an automated system to improve the environmental situation of a "smart city" at the hackathon in December 2020. Questions that the participants had to answer in order to successfully solve the problem: what to control to improve environmental safety; what devices and sensors are needed, where and how to install them; where the information received by the automated system will be transferred; and what economic and environmental effects will be achieved through the proposed solution. Teams had to present a project of an automated system using schemes for placing sensors and actuators and a presentation with an algorithm of work.

Another example is the annual round table "The Future of Russian Informatics" in the World cafe format. Students unite 5–6 people to discuss. There is a "host of the table" who writes down the proposed ideas and passes them on to the next group, for each issue discussed. The group discusses the problem at the table for 15 min, after which there is a change of groups at the tables. New members complement the work of the previous group.

World cafe was held in a distance format in the 2020–2021 academic year. Such digital tools as https://zoom.us, https://discord.com, https://miro.com were used for interaction. Zoom is a service for video conferencing online meetings. It played the role of a central channel on which there were presenters, leading the events and commenting on the situation, within the framework of the World cafe. Discord is a video conferencing messenger. The service replaced the "tables", where there was a discussion in groups, within the World cafe. Miro is an on-line interactive whiteboard where participants recorded their suggestions for solving problems. There is no doubt that the World cafe format is a good tool for the development of all the key competencies listed above.

The use of the project method, educational and research activities, starting from the junior bachelor's courses, are also effective for the development of all competencies. The experience of organizing educational and extracurricular project activities of students of the "Information systems and technologies" program is presented in publications.

Let us give other examples of network activities of students in this area of training for the formation of key competencies of the digital economy: various events to celebrate the day of Russian informatics; scientific and practical conferences and round tables on topical problems of the domestic IT sphere, including in a distance format; network projects; and web quests. All students of Minin University maintain electronic portfolios of their achievements, which can be presented to employers in the future.

24.4 Conclusion

The approaches to the formation of key competencies of the digital economy in the framework of the educational program for future bachelors of the "Information Systems and Technologies" program of Minin University are considered.

The didactic possibilities of using various digital tools are considered, and examples of tasks for the development of critical and creative thinking, the ability to work with information, the organization of cooperation of students, their self-development are given. Further formation of key competencies occurs within the framework of professional modules, educational and industrial practices, research activities, extracurricular work.

In addition to the formation of key competencies, it is also important to master modern tools, the so-called end-to-end technologies of the digital economy: blockchain, artificial intelligence, VR and AR technologies, the Internet of things, big data technology, and robotics. It is necessary to create appropriate laboratories, to revise programs of disciplines and practices for these at universities.

Also, the development of options for organizing the interaction of all participants in economic relations from different countries with the help of appropriate digital platforms and tools is on the agenda. And this is the task of both teachers leading IT disciplines and teachers of economic disciplines.

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Chapter 25
Development of Soft-Skills in Order to Increase the Professional Motivation of Students in the Modern Economy

Elena A. Kostyleva, Elena N. Galkina, Nelli G. Perevozchikova, Elena U. Salyaeva, and Julia S. Klyueva

JEL Code A2

25.1 Introduction

The processes of globalization and digitalization have rapidly engulfed the world economy which require continuous development from the modern generation in order to meet the latest trends, the requirements of professional and educational standards in the regime of constantly changing conditions and factors.

One of the most urgent demands of the business community, presented in the labor market to job seekers, is the possession of soft-skills, which are important both in the professional sphere and in everyday life. Soft-skills means «soft skills», that is, skills that are not related to a specific profession, but are necessary for effective work, career growth, and team interaction. According to experts, the most significant competence will be «the ability to solve complex problems», the second—«critical thinking» and the third—«creativity». These are followed by the following competencies: «teamwork», «people management», «coordination and interaction skills», «emotional intelligence», «judgment and decision-making», «customer focus», «negotiation skills», and «cognitive flexibility». At the same time, there is such a thing as hard-skills, that is, «strict skills». They include specific knowledge and skills required for a particular profession. The combination of hard- and soft-skills increases the competitiveness of any employee in the labor market.

Foreign experts believe that graduates of higher educational institutions should have both professional and flexible skills to meet the current requirements of the labor market.

E. A. Kostyleva · E. N. Galkina · N. G. Perevozchikova · E. U. Salyaeva · J. S. Klyueva (✉)
Institute of Food Technologies and Design – a branch of State University of Engineering and Economics, Nizhny Novgorod, Russia

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The authors of the research suppose that the development of soft-skills helps to increase the professional motivation of students of higher educational institutions, so the basic educational programs must necessarily include disciplines that contribute to the formation of «soft skills». In addition, there are currently quite large changes in the motivation of university students for professional activity.

On the one hand, the needs of personality development and the functioning of society determine the relevance of the research topic. On the other hand, this is due to the formation of a lack of specific empirical data on the role and place of professional motivation of students with a variety of existing theories (Belokrylov, 2012).

25.2 Methodology

The complexity and multi-aspect of the problems of motivation techniques determines the multiplicity of approaches to understanding its nature, structure, essence, as well as to the methods of its study (Rubinstein, G. Murray, Aseev, Bozhovich, Levin, Leontiev, Markova, Yadov, Maslow, McClelland, Hertzberg, etc.) (Prokhorova, 2012).

In the scientific category "motivation" are several classical specialists in sociology and specialists in psychology engaged in the development of meaningful theories of motivation: Maslow, McClelland, Heckhauser (Psychology of personality in the works of foreign psychologists, 2013).

Most researchers point to the polymotivational nature of labor activity (Imedadze, Bozhovich, Aseev, Vilyunas, Shadrikov, Levin, Atkinson) (Grebenyuk, 2009), (Rean, 2015).

Revealing the role of soft-skills in professional motivation of students is the purpose of this study. This is what the solution of the indicated problem will lead to.

The object of the research is the professional motivation of students of the Institute of Food Technology and Design—a branch of the State University of Engineering and Economics (IPTD—a branch of the SUIE).

The subject of the study is the diagnosis of professional motivation of students.

To achieve the goal, you must complete the following tasks:

1. Research the professional motivation of university students;
2. Process and describe the results of the study;
3. Develop an additional program «Soft-skills Academy», the purpose is to create conditions for the development of soft-skills among students.

The main purpose of this work allowed the authors to put forward and formulate hypotheses:

- Professional and educational-cognitive motives are predominant among students of the IFTD.

- The most significant motives in choosing a profession are social, cognitive, and creative motives.

25.3 Results

Empirical research on the professional motivation of students' activities was carried out on the basis of the IFTD—a branch of the SUIE. The research involved students of the 1st year of full-time and part-time education; the sample was 200 people.

The results of a research using the method «Diagnostics of motives of students learning activities» by Rean and Yakunin, modified by Badmaeva is presented in Table 25.1 (Badmaeva, 2010).

The diagnostic results clearly indicate the predominance of «professional motives», followed by «educational and cognitive motives» and «social motives».

This group of students is focused on research work, practical training, and is ready for further professional activity. Students show interest in the methods of independent acquisition of knowledge and are able to rationally organize their educational process, and are focused on the assimilation of specific academic subjects.

The meaning of «communication motives» is quite close. This suggests that the main motivations of the respondents learning are focused on the process and results of education.

Thus, professional and educational-cognitive motives are predominant, which confirmed the first hypothesis formulated by the authors. It can be concluded that the interviewed students have a fairly high level of academic motivation.

Based on the data obtained by the method of Ilyina «Studying motivation in higher education», histograms were compiled for two positions:

(1) by age;
(2) by the characteristics of the education available at the time of admission to the university (Rozhdestvenskaya, 2009).

From 18 to 21 years are students who do not have any professional education (they have only a full secondary education).

Table 25.1 Results of the research on the methodology «Diagnostics of motives of students' learning activities»

Motives	Average values
Communicative motives Avoidance motives	3.6 3.2
Prestige motives	3.5
Professional motives	3.9
Educational and cognitive motives	3.7
Motives of creative self-realization	3.2
Social motives	3.7

Source Compiled by the author

Table 25.2 Average score according to the method of Ilyina «Motivation of studying at the university» on three scales (by age)

Age	Scale		
	«acquisition of knowledge»	«mastering a profession»	«obtaining a diploma»
18–20	11.5	6.9	7.2
21–25	12.0	8.6	5.2
26–30	10.8	7.3	6.6
31 and older	9.3	7.3	6.5
Max	12.6	10	10

Source Compiled by the author

From 22 to 25 years are persons who have some professional education and minimum work experience in the profession or in another branch of industry.

From 26 to 30 years are persons who have some professional education and sufficient work experience in a profession or in another industry and have not finally decided on the choice of a profession for a number of reasons.

Between 31 and older are persons who have some professional education and sufficient work experience in a profession or in another industry and have made a final decision about changing their professional activity.

According to the results of the application of the methodology «Study of motivation in higher education», the following results were obtained.

The motives «to get a diploma», «to ensure the success of future professional activity», and «to acquire deep and solid knowledge» are the most significant for students of the IFTD branch of the SUIE.

Interpretation of the results:

- The scale «knowledge acquisition» has a maximum number of points—12.6;
- The scale «mastering the profession» has the maximum number of points—10;
- The scale «getting a diploma» has the maximum number of points—10.

Table 25.2 shows the obtained average score according to the method of T. I. Ilyina «Motivation of studying at the university» on three scales.

According to the scale of «knowledge acquisition», higher rates are observed among the students aged 21–25. Most likely, this is due to sincere motives in achieving their goals: acquiring knowledge and having a diploma for high-quality mastery of the profession.

On the scale of «mastering the profession», higher rates are also observed among students aged 21–25. They already have a professional education and minimal work experience in the profession or in another industry.

On the scale of «obtaining a diploma», higher rates are observed in students aged 18–20, which is characterized as a formal external sign of educational activity. The largest number of students are focused only on obtaining a diploma but at the same time half of them have a desire to acquire knowledge.

The motive of «acquiring knowledge» is ahead of the motives of «mastering a profession» and «obtaining a diploma», and thus is an analogy for the motive of «becoming a highly qualified specialist».

Table 25.3 shows the average score according to the method of Ilyina «Motivation of learning in higher education» on three scales.

For students with secondary education the scale of «knowledge acquisition» prevails, and in the second place—«mastering a profession» and «obtaining a diploma».

Students with secondary vocational training and higher vocational education have the highest score on the scale of «knowledge acquisition», and in the second place is «mastering a profession».

On the scale of «getting a diploma», higher rates are observed among students with secondary education.

The authors also used the «Methodology for determining the main motives for choosing a profession» (by Pavlyutenkov). This method allows you to determine the role of certain motives when choosing a profession. The results are presented in Table 25.4.

It can be concluded that social, cognitive, and creative motives are the most significant in choosing a profession, according to the results of the application of this technique. This confirmed the second hypothesis.

Many people distinguish social significance, focus on society, social goals, and needs in their future profession. Students strive to realize themselves in professions where they can acquire new knowledge and skills related to this profession.

Next in importance are the moral and material ones. Students strive for self-improvement in their work, understand the need to learn and are responsible for their learning. The desire for material benefits and financial security in work is also a significant factor.

The least significant motives are utilitarian, prestigious, and related to the content of the work. This indicates a high level of awareness of students when choosing a

Table 25.3 Average score according to the method of Ilyina «Motivation of studying at the university» on three scales (according to the level of education)

Characteristics of education	Scale		
	«acquisition of knowledge»	«mastering a profession»	«obtaining a diploma»
Secondary education	10.1	7.2	7.2
Secondary vocational training	11.6	8.5	5.2
Higher professional education	10.2	7.0	6.6
Max	12.6	10	10

Source Compiled by the author

Table 25.4 Average values based on the reasons for choosing a profession

Motive groups	Average values
Social	8.7
Moral	7.1
Aesthetic	7.4
Cognitive	8.5
Creative	7.7
Motives related to the content of the work	6.2
Material	7.1
Prestigious	6.3
Utilitarian	6.7

Source Compiled by the author

profession, the desire for self-development and self-improvement (Kostyleva et al., 2016a, 2016b).

25.4 Discussion

According to the results of the study, we can conclude that.

1. Professional and educational-cognitive motives prevail according to the methodology «Diagnostics of the motives of students' educational activity» by Rean and Yakunin as modified by Badmaeva. This confirms the first hypothesis. A high level of educational motivation is observed among the surveyed students.
2. According to the method of Ilyina «Motivation of studying in higher education», the scale «acquisition of knowledge» prevails among students with secondary education, in second place—«mastering a profession» and «obtaining a diploma».

Students with secondary vocational training and higher vocational education have the highest score on the scale of «knowledge acquisition», in the second place «mastering a profession».

On the scale of «getting a diploma», higher rates are observed among students with secondary education.

1. The results of the «Methodology for determining the main motives for choosing a profession» (by Pavlyutenkov) showed that the most significant motives in choosing a profession are social, cognitive, and creative motives, which confirmed the second hypothesis.

Thus, the predominance of social, cognitive, and creative motives in choosing a profession suggests that students strive for development in their profession, for self-improvement. Therefore, the formation of soft-skills will help to increase the

professional motivation of students, for this it is necessary to develop a program of additional education «Soft-skills Academy».

25.5 Conclusion

The program of additional education «Soft-skills Academy» will be aimed at developing the following «soft skills» among students of the IFTD—a branch of the SUIE (Shipilov, 2020):

- people management skills—primary leadership skills; communication and organizational skills;
- having a «vision» of solving a problem situation and organizing people to implement this «vision»;
- negotiation skills, skills of inter-group and personal interaction;
- coordination and interaction skills from the position of the negotiation process; persuasion and argumentation skills;
- ability to use non-verbal communication techniques;
- judgment and decision-making skills;
- forming your own opinion;
- showing courage in making independent decisions;
- the ability to be responsible for their consequences;
- skills in the field of time management;
- emotional intelligence—recognizing emotions and understanding the intentions of other people based on an understanding of their values and needs (Kostyleva et al., 2016a, 2016b);
- critical thinking and creativity—non-standard approach in thinking and behavior to everything, including problem-solving;
- awareness and creative development, innovation and modeling based on the integral approach and nonlinear solutions.

A complex of academic disciplines, which consist of eight sections, is necessary for the formation of soft-skills (Modern educational technologies: a textbook, 2010). Each direction involves an educational block, which combines a theoretical basis and practical work.

Section 1. Personality and individuality are aimed at studying the types of personality and the emotional-volitional sphere of the individual. The practical lesson includes trainings on the development of self-confidence and Self-Concepts, as well as techniques, teaching techniques and methods for developing self-confidence.

In Sect. 2, students are introduced to self-esteem, types of self-esteem, and ways to improve it. Fear, complexes, and barriers. Exercises to overcome internal barriers and complexes. Performing diagnostic techniques.

Section 3 is a study of the types of character accentuations according to Lichko, the concept of temperament, and its features. The section hosts a discussion on the topic: “Tolerance in the modern world.”

In Sect. 4, the concept of stress, conflict is given, and the rules of conflict-free communication and conflict resolution technologies are considered. Training on emotion management is being conducted.

The fifth section is intended for the formation of knowledge, skills, and abilities to improve the choice of communication strategies in employment and interaction in the work collective in the future to maximize the effectiveness of professional activities among future specialists.

Mastering the course «Methods of time management in the organization» is assumed in the sixth section. It promotes the acquisition of knowledge, skills, and abilities in the field of time management. Methods of accounting for the budget of time and modern technologies for increasing the efficiency of time management are presented in the framework of group and individual work.

In Sect. 7, techniques for activating mental activity, and developing imagination and fantasy are presented. The concept of critical thinking and exercises for imagination and critical thinking are considered.

In Sect. 8, students work with the concept of leadership and social activity. They are trained to develop their leadership skills. Exercises to identify and develop leadership skills. Portrait of a modern leader.

Students will have to master the basic skills of working with infographics and data presentation in professional activities in the final block. Knowledge about modern trends in data visualization, technologies for searching and structuring information, and methods and techniques for constructing presentations are given in the process of individual and group work.

Studying all parts of the program of additional professional education “Academy of soft-skills” will allow alumni of the IFTD to receive and develop additional communicative, personal, and managerial competencies. And, of course, this will contribute to their professional development.

Organization of courses on the formation of soft-skills and their introduction into the educational process through the system of additional professional education in the IPTD—a branch of the NGIEU, of course, are efficient.

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Chapter 26
Social and Information Space of Student Youth in a Situation of Uncertainty

Nina M. Shvaleva, Julia F. Kosintseva, Lyubov B. Voronkina, and Svetlana S. Asatryan

JEL Codes I18 · I2 · I23

26.1 Introduction

A specific feature of the modern social and information space is the increase in the intensity of communication processes, which are provided by a large number of new means of accumulating, storing, and transmitting information, including social networks. Communication is a connecting link and a meaningful part of the interaction not only between specific people but also between the individual and social networks in the social and information space. The communication process arises through the directed transmission of information, allows establishing social (socio-professional and socio-cultural) interactions between the subjects of society, and this is also considered as a special form of social ties.

Socio-informational space is a condition for the professionalization of a person and is a holistic education that includes formed motives aimed at professional and personal self-determination.

The object of research in the presented work is the social and informational space of student youth in a situation of uncertainty.

The subject of the research is the social information space (information space of social communications) of student youth in a pandemic.

N. M. Shvaleva · L. B. Voronkina (✉)
Pyatigorsk State University, Pyatigorsk, Russia

J. F. Kosintseva · S. S. Asatryan
North Caucasus Federal University, Stavropol, Russia
e-mail: asatryan_78@list.ru

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The problem lies in the ways of forming the information space of social communications of students and the role of social institutions, family, culture, education in the global information space; in definition the determinants of the formation/transformation of the social and information space of students in a pandemic (destruction of the functioning of systems of direct communication).

The purpose of this research is to define the main determinants of the formation of a (professional) social and information space of students (using the example of North-Caucasus Federal University), updated in the context of a pandemic.

The reliability of research results is ensured through the basic methodological principles of research, its implementation at the theoretical and practical levels, using a set of research tools adequate to the object, as well as subject of research; the statistical significance of the data obtained, the practical orientation of the study, and the possibility of introducing the results into the educational process of higher educational institutions.

The main goal of the study, which consists in defining the determinants of the formation of the social and information space of students, updated in the context of a pandemic, was achieved from the position of a subjective approach to the development of the activity, which arises in the personal and professional self-determination of student youth.

Of particular importance is the theoretical and applied model of the development of the social and information space of an individual's activity, the actualization of his capabilities in choosing and building his own information space, an individual trajectory of socio-cultural development during a pandemic.

The hypothesis is formulated and empirically proved that the social information space is determined by the amount of information that the student operates, the nature and method of information interactions, and the use of information transmission channels available to him. The student enters into them in the process of professional and personal self-determination, so it is a significant part of the educational environment for students. Social and information space in situations of uncertainty can be successfully formed while organizing the subjective way of a student's life (Shvaleva et al., 2021).

Considering the social and information space of student youth in a situation of uncertainty through the subjective way of life as a humanitarian technology, it is expedient to single out its cognitive and emotional content.

The cognitive complexity of the individual's ideas appears under the condition of the indivisibility and consistency of the picture of the world, as an understanding of the current life situation and position in it, is the subject. At the same time, the existing contradictions contribute to cognitive distortion and determine the perception of the situation as uncertain. The emotional complex dominantly manifests itself in experiences caused by the successful (unsuccessful) functioning of all aspects of the personality. Dissonance in the emotional sphere causes emotional discomfort, along with a sense of personal dysfunction; while a positive emotional attitude indicates the achievement of individual well-being, perceived as objective and subjective well-being (Tyrsikov, 2009).

The study of the processes of formation of the actual social and information space of student youth lays in the determination of the preferred information channels, updated by students, including their areas of professional training.

The need for information is one of the basic needs of the individual, which is integrated into all the diverse spheres of human life. The volume and properties of the information space depend on the social status of a person, social circle, level of education, and other economic, socio-cultural, as well as political factors. The individual properties of the subject also determine his information needs, the quantity, and the quality of the received information. In this context, to determine the characteristics of a person's social space and the formation of an information environment, it is necessary to study his lifestyle in society.

Social communication is presented as a universal socio-cultural mechanism, which is aimed at the interaction of social subjects, at "the reproduction and dynamics of socio-cultural norms and patterns of such interaction" (Kosintseva, 2018). In this context, the interaction of social subjects is the backbone of society. In addition, an individual can independently choose the method and form of his behavior, which determines the nonlinearity and complexity of the development of individual groups and society as a whole. Accordingly, society can be viewed as a conglomerate of networks of relations of social subjects (elements), which are permanently emerged and supported by communication processes.

The subjective way of organizing life as a condition for building developing psychological and pedagogical practice realizes the idea of relying on self-development and self-organization, i.e., on the student's potential and the stability of his personality, stimulating the process of personality self-development, forming a positive self-concept (Tyrsikov, 2009).

The needs and motives of a person determine self-development. That is why an important task in the implementation of psychological practice is the positive motivation of the individual to change and to overcome gradually increasing difficulties in the course of self-realization, as well as self-development (Shvaleva, 2012).

The authors consider the subjective way of organizing life and its place in the formation of the social environment and information space of students; so, self-development is presented as the leading need of student youth, realized in the course of interaction of various subjects of the educational process in the online learning mode.

Self-regulation of activity and behavior consists of an objective study of the process of self-development, hidden from direct observation (Voronkina, 2016). The psychological criteria of personal self-development in the context of the content of educational activities during a pandemic can be presented as follows: the results of self-development are manifested in the activities and behavior of students, as well as in the ability to regulate them. Computer technology is important for the development of a young person, providing new opportunities for self-realization and the development of a person's creative potential. At the same time, information as a universal category plays a rather important role in obtaining modern knowledge. If the need for obtaining information and information exchange is more voluminous, it has a decisive effect on the consciousness, behavior of a young person, determines

his lifestyle, way of life, underlies decision-making, communicative relations, and forms a worldview (Kosintseva, 2020).

Characterizing the situations of uncertainty experienced by young people, it should be noted that a certain way of life is being formed, which can be considered as a form of free choice by the individual of his daily manifestation, behavior, and realization of the need for activity and self-development (Voronkina, 2017).

The social living environment of young people is a social information space formed by the interaction and interpenetration of several social systems, mastered by a social subject: family, immediate environment, informal youth associations, student environment, professional social, and intellectual space with the help of, for example, professional publications (including on electronic media), the scientific and intellectual environment of the university, as well as the media.

The life situation of a young person is determined by the intensity of interaction, the influence of the elements (communities) of his living space, and opportunities for realizing the needs of the individual, which can be provided by the environment. At the same time, the choice of this or that "fragment of the environment" presupposes following the rules, norms, and customs. Also, in the above-mentioned environments, the requirements imposed can be in contradiction to each other, imposing a choice on an individual, causing an intrapersonal conflict (Asatryan, 2013). It is necessary to take into account that the main reasons determining the immediate life situation arise in the family or the immediate social environment/reference circle, but a more significant impact can be exerted by the macro-environment, affecting the socio-cultural and material situation of social subjects, as well as the meso environment, as a carrier of informational, educational, educational, preventive, and other aspects. Thus, it is necessary to analyze the influence of these components, while studying the professional and informational environment of student youth.

26.2 Materials and Methods

The concept of personality subjectivity sets a different scale for understanding the way of organizing the life of a young person/student. At the same time, when a situation of uncertainty arises, it is necessary to form a subjective way of organizing life activity, based on the student's ability to independently transform his environment, in which his activity is realized and relationships are established with the outside world, with other people. The environment, in this context, is a "living integrity," which can be characterized by purposefulness, activity, freedom, and the ability to self-development.

To study the impact of the situation of uncertainty on the social and information space of student youth, its motivational and need-based sphere, the authors used the questionnaire "Social and information space of students in a pandemic."

Thus, while organizing an experimental study on the development of the social and information space of student youth for the period of quarantine, determining the role of the subjective way of life of young people in situations of uncertainty, the authors

used as a basis on the following proposition—the implementation of the model of building the development of subjectivity reduces the problematic burden of the student, develops his reflection, activity, self-development, and also independence.

The fundamental foundations of the scientific issues, which are studied in this article, are laid in publications of Annikova et al. (2019) and Kazarinov (1999).

26.3 Results

The hypothesis is formulated and empirically proved that the social information space/environment is a part of the educational environment of students and can be determined by the amount of information that a young person possesses through the information transmission channels available to him, and the nature and type of information interactions that he enters into in the process of professional and personal self-determination. Socio-informational space in situations of uncertainty can be successfully formed in the process of organizing the subjective way of a student's life.

The survey involved 519 students of the North Caucasus Federal University, aged 20–21, enrolled in undergraduate and specialist degrees. The majority of students (82.3%) like their future profession ($J_{\text{interest in the profession}} = 0.568$).

While distributing professional interests by branches of knowledge, it should be noted that some of the respondents were undecided about their preferences. Additionally named: the psychology of communication with people, tourism, physical education and sports, acting, music (one answer each)—only 1.0%. The respondents are interested (by rank) in the social sciences and the humanities—40.6% of the answers; art, culture—27%; natural sciences—24.5%; engineering and technical sciences—24.1%; law and legal sciences—22.5%.

Comprehensive research includes the following areas:

1. Study of the actualized social and information space of student youth in terms of the formation of a professional information environment, including the definition of the processes of formation of professional communications.
2. Definition of preferred information channels updated by students, including their areas of professional training.
3. Definition of the determinants of the formation of the social information space of students, updated in the context of a pandemic.

Students of North-Caucasus Federal University prefer to use the Internet for obtaining information (94.8% of respondents), books (49.3%) and electronic reference publications (33.3%), ask knowledgeable people (25% of answers), the media (22.5%), professional journals, and scientific collections (20.6%). So, in the area of professional interests, preference is given to electronic media—the Internet, electronic reference publications. The role of direct communication channels is quite large too (choice of 25% of respondents).

At the same time, the need for obtaining professional knowledge among the majority of respondents was formed, the level of formation $J_{\text{the need to expand prof. knowledge}} = 0.593$, as well as 59.3%, have a significant need for professional knowledge, and an insignificant one—25.6%; 9.4% found it difficult to answer. Only 5.6% of students do not feel the need to replenish or expand their professional knowledge. The degree of realization of the need for expanding professional knowledge is also small $J_{\text{implementation of the need in prof. knowledge}} = 0.299$ (12.1% read professional literature regularly; 35.6% read from time to time; sometimes read—42%; do not read—10.2%).

The overwhelming majority of respondents have the means and opportunities to use the modern electronic information space. 82.1% have a computer with an Internet connection at home; a cell phone with Internet access—11.6%; a computer without an Internet connection or with poor connection quality—5.2%, 0.8%—no computer/tablet. At the same time, 17.9% of students in self-isolation do not have conditions for any educational and/or professional activity.

During the period of forced self-isolation, the respondents spent 1–2 h at the computer (by rank)——6.9%; 2–4 h—15.2%; 4–6 h—26.4%; 6–8 hours25.4%; more than 8 h—22.4%. Some respondents noted that the time on the computer depends on the count of homework that needs to be done—0.6%; in addition, sometimes it is not necessary to work on the computer—only 1.1% of the answers.

The overwhelming majority of students (96%) were able to learn to use the public platforms Skype, Zoom, BegBlueButton for study (56.6% fully, 41.2% partially, 8% did not master), the degree of use was $J_{\text{use Skype, Zoom, BegBlueButton}} = 0.774$. The respondents noted the difficulties associated with the quality of the Internet and the quality of the platforms, as well as the difficulties of perception in distance education.

For 18.3% of respondents, nothing has changed with the transition to the remote form of education. For the majority of respondents, the nature of social communications with teachers has changed. There is a formalization of communication/learning (7.1%), strengthening control (8.3%), increase in the number and volume of homework (41.2%), fully independent learning (12.7%), and increase in the volume of literature for study (7%): in general, there is a decline in the quality of education/training.

At the same time, in the case of remote learning, the majority of students (55.5%) did not use the library sites; however, 27.4% used electronic catalogs; 25.4%—free access to electronic databases; 13.5%—online selection of literature/articles.

30.3% of future specialists—students of North-Caucasus Federal University, do not read because of employment/lack of desire. For 38.9% of the respondents, the main source of information is the Internet; 14.5% have a good supply of educational literature at home. At the same time, the readers of public or state libraries are 11.6%—libraries at the place of work or study; 10.6%—district/city; 5.4%—the regional library.

Subjective activity arises in the personal space and professional self-determination of student youth, in the conscious acts of identifying and affirming their attitude to problem situations in conditions of self-isolation.

The result of the conducted research was the definition of the social information space actualized in the student environment in its intellectual and professional part:

1. Studied the social and information space of student youth in terms of the formation of a professional information environment, including the definition of the characteristics of the way of life and the processes of formation of professional communications.
2. Preferred information channels updated by students have been identified, including their areas of professional training.

26.4 Conclusion

The updated social information space of young people is determined by the available information space: electronic resources, home libraries, Internet communities, forums, and social networks.

The role of official electronic information systems (television, radio) is significantly reduced. At the same time, there is a steady high need for advice from specialists and teachers in organizing information retrieval. Individually formed social networks and electronic information resources become the determinants of the social information space.

The choice of the source/medium of information (books, films, etc.) is determined by the respondent, and self-confidence increases under the conditions of the subject way of student's life.

Among the sources of information, respondents prefer (by rank): Internet—76%, books—39%, television—36%. The importance of newspapers and magazines as sources of information, including professional publications is 26%.

The study demonstrates that the inclusion of student youth in the professional information space is determined by the professional social and information space formed at the university and the quality of communication channels. These channels of inclusion in the professional communicative information space are determined by their accessibility. In comparison, the integral index of the availability of information professional space for teachers in the conditions created at North-Caucasus Federal University was $J_{\text{available. prof. inf. space, pps NCFU}} = 0.4289$. Accordingly, the degree of accessibility of professional space for student youth in a federal university is $J_{\text{available. prof. inf. space of youth NCFU}} = 0.3074$.

It was found that the actualized channels, which determine the formation and/or expansion of the social information space of student youth are (by rank) personal communication, indirect information (reading), electronic social networks, interpersonal interaction, and information during the educational process. Students adhere to traditional methods of communication; the majority of respondents are characterized by participation in a network community that does not exceed a group of 3–5 people. Family members and friends are still significant elements of the nearest social network (micro-social space), with increased interpersonal communication

using electronic forms of communication (IT telephony, social networks). Participation in the professional community is passive; the use of electronic communications in the professional space is insignificant.

The determinant of increasing the activity of students in vocational training (the formation of a professional social and information space) is the creation of an open-access information environment at the university (public high-speed Internet, open access to scientific electronic libraries, the availability of places for free discussion, accessible computer technology, and equipment in classrooms).

The presented results of the study of the social and information space of student youth in a situation of uncertainty as a socio-cultural phenomenon formed in the process of online learning during a pandemic reveal the mechanisms of subjective activity in the conditions of the subjective way of life, which are the integration of semantic factors, situations, and circumstances that carry the emergence of needs in development and self-development with the participation of the subject.

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Chapter 27
Training of the Digital Workforce from Today's Youth: Individualization Versus Standardization

Anna V. Bodiako, Svetlana V. Ponomareva, Tatiana M. Rogulenko, Yuriy A. Krupnov, and Teimuraz A. Kemkhashvili

JEL Codes H42 · I21 · I23 · I25 · I28 · J13 · L15 · N35 · O14 · O15 · O33 · O35 · P36 · P46

27.1 Introduction

Central Asia and Russia desperately need a digital workforce to accelerate the growth of their knowledge-intensive and high-tech economies. The scientific and practical significance of studying this group of countries lies in their unique identity—geographically (all or parts of the countries are located in Central Asia) and in terms of socio-economic development and income (they are all developing countries). Similar to other developing countries, Russia and the countries of Central Asia must demonstrate accelerated (ahead of developed countries) economic growth to expand their presence in world markets. Therefore, training personnel for the fast-growing digital economies is vital.

A. V. Bodiako (✉) · Y. A. Krupnov
Financial University Under the Government of the Russian Federation, Moscow, Russia
e-mail: anna.bodyako@inbox.ru

S. V. Ponomareva
Saint Petersburg State University of Economics, St. Petersburg, Russia

T. M. Rogulenko
State University of Management, Moscow, Russia

Y. A. Krupnov
Moscow Region State University, Mytishi, Russia

T. A. Kemkhashvili
Bauman Moscow State Technical University, Moscow, Russia

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The most promising area is the training of digital personnel among young people. This group of people represents the most flexible audience, which receives higher education for the first time in their lives and, therefore, is characterized by the most responsible approach to mastering the educational material. The receptivity of young people makes it easier and faster for them to adopt digital competencies and a digital culture that is often alien to older generations. The problem lies in the slow pace of digital training among young people in Russia and Central Asia.

This paper hypothesizes that the cause of the problem is the inapplicability of the current approach to state regulation of higher education to the process of digital training. The digital workforce should not be subjected to the standardization observed in the higher education systems of Russia and Central Asia because of the high demand in the market, the expanded opportunities for students to return their investment in higher education, and the constantly changing requirements of practice.

The paper aims to determine the optimal approach to training digital personnel among today's youth in Russia and Central Asia, contrasting individualization and standardization.

27.2 Literature Review

This research is based on the existing secondary literature on digital training among today's youth in Russia and Central Asia. The issues of training the digital workforce among today's youth are discussed in the works of Le et al. (2019), Macann and Carvalho (2021), and Mehrvarz et al. (2021). Features and current practical experience of training digital personnel in Russia and the countries of Central Asia are considered in the works of Davydov (2021), Kosenchuk et al. (2021), and Popkova and Sergi (2021).

This research is also based on existing programs and concepts of the digital economy in Russia and Central Asian countries. The review of these programs shows that they have been adopted and operate in all countries in this group. For example, the EAEU countries (including Russia, Kazakhstan, and Kyrgyzstan) have developed a Digital Agenda 2025 (World Bank Group & Eurasian Economic Commission, 2021). India (Ministry of Electronics and IT, Government of India, 2021) and China (Digital China Group Co., 2021) also have national programs for digital economic development.

A content analysis of the above programs and concepts has shown that they pay considerable attention to the training of digital personnel among young people. Nevertheless, the review of these programs and concepts and the analysis and review of the secondary literature revealed a gap related to the uncertainty of the preferred approach to training digital personnel among today's youth in Russia and Central Asia. The identified gap is filled in this research.

27.3 Materials and Methods

To test the hypothesis, the authors apply economic and mathematical apparatus. Using the method of trend analysis, the authors study the dynamics of the level of digital competencies in society and economy in Russia and Central Asian countries in 2017–2019. The method of regression analysis is used to determine the dependence of a given level (y) on the following:

- Index of Economic Freedom (x_1);
- Selected indicators of competitiveness and market freedom of leading universities in Russia and Central Asia in 2021: competitiveness (x_2), number of students per one teacher (x_3), and the share of female students (x_4).

The research model is as follows:

$$y = \lambda + \delta_1 * x_1 + \delta_2 * x_2 + \delta_3 * x_3 + \delta_4 * x_4 \tag{27.1}$$

The economic sense of the hypothesis is that, first, there should be a positive regression of the level of digital competence with economic freedom ($\delta_1 > 0$), the competitiveness of leading universities ($\delta_2 > 0$), and the proportion of female students ($\delta_4 > 0$). Second, a Pareto optimum must be found in which full mastery of digital competencies ($y = 7$) is achieved using the factors of economic freedom and market freedom of universities (both conditions must be met simultaneously to confirm the hypothesis).

27.4 Results

The empirical data for the study are shown in Tables 27.1, 27.2, and 27.3.

According to Table 27.1, in 2021, the highest level of economic freedom in Central Asia is observed in Kyrgyzstan (63.7 points), and the lowest—in Iran (47.2 points).

According to Table 27.2, the highest competitiveness of universities among Central Asian countries is observed in China (20th place, 84.8 points).

Horizontal analysis of the data from Table 27.3 shows that the largest increase in the level of digital skills in society and economy among Central Asian countries for 2017–2019 was observed in Russia (7.14%). During the reviewed period, countries such as Iran (−3.29%) and Kyrgyzstan (−3.02%) saw a decrease in digital competency.

The correlation of the factors of individualization versus standardization in training digital personnel among today's youth reflects the regression model that refines the research model (27.1) and is derived from the data in Table 27.1, 27.2, and 27.3:

$$y = -2.67 + 0.09 * x_1 + 0.01 * x_2 + 0.06 * x_3 + 0.01 * x_4 \tag{27.2}$$

Table 27.1 Characteristics of economic freedom in Russia and Central Asia in 2021

Source of classification	Country	Category of countries by level of economic freedom	Index of economic freedom (x_1), points 1–100
			Index of economic freedom, score 1–100
Britannica	Kazakhstan	Mostly free	71.1
	Kyrgyzstan	Moderately free	63.7
	Uzbekistan	Mostly unfree	58.3
	Turkmenistan	Repressed	47.4
	Tajikistan	Mostly unfree	55.2
UNESCO	Mongolia	Moderately free	62.4
	Afghanistan	Mostly unfree	53.0
	Iran	Repressed	47.2
	Pakistan	Moderately unfree	51.7
	India	Mostly unfree	56.5
	China	Mostly unfree	58.4
	Russia	Moderately free	61.5

Source Compiled by the authors based on the materials of HeritageFoundation (2021)

Model (27.2) shows that the considered factors positively impact the training of digital personnel among today's youth. Model (27.2) allows finding the required Pareto optimum (Fig. 27.1).

According to Fig. 27.1, the average level of digital competencies in Central Asia can reach a maximum (7 points, +115.05%) with de-regulation and individualization, which requires the following:

- Increase in the index of economic freedom by 72.23% (from 57.20 points to 98.51 points);
- Increase in the competitiveness of leading universities by 4.07% (from 19.42 points to 20.21 points);
- Increase in the proportion of female students by 2.68% (from 16.50% to 16.94%).

27.5 Conclusion

The conducted research proved the hypothesis that standardization is inapplicable to training personnel for the digital economy among youth. Instead, the authors propose a new approach that relies on individualization. The authors have found a promising Pareto optimum, in which the level of digital competence in Central Asia can reach the maximum (7 points, +115.05%) with de-regulation and individualization. For this purpose, it is recommended to increase the index of economic freedom by 72.23%,

Table 27.2 Selected indicators of competitiveness and market freedom of leading universities in Russia and Central Asia in 2021

Source of classification	Country	The leading university in the country	Place in the ranking	Overall score, 0–100	No. of students, thousand people	No. of students per teacher	Share of female students, %
				x_2	–	x_3	x_4
Britannica	Kazakhstan	Al-Farabi Kazakh National University	1001 +	10.3–25.0	22,116	4.6	56
	Kyrgyzstan	–	–	–	–	–	–
	Uzbekistan	–	–	–	–	–	–
	Turkmenistan	–	–	–	–	–	–
	Tajikistan	–	–	–	–	–	–
UNESCO	Mongolia	–	–	–	–	–	–
	Afghanistan	–	–	–	–	–	–
	Iran	–	–	–	–	–	–
	Pakistan	Abdul Wali Khan University Mardan	501–600	36.4–39.7	9664	22.7	29
	India	Indian Institute of Science	301–350	45.6–47.9	4038	9.3	27
	China	Tsinghua University	= 20	84.8	37,484	11.6	34
	Russia	Lomonosov Moscow State University	= 174	55.9	28,525	8.4	52

*Note** "–"—universities in this country are not represented in the ranking
Source Compiled by the authors based on the materials of Times Higher Education (2021)

the competitiveness of leading universities by 4.07%, and the proportion of female students by 2.68%.

The contribution of this research lies in the clarification of a set of factors and the nature of their influence on the success of training of today's youth for the digital economy. It is established that standardization in the aspect of rationing the number of teachers and students in universities has a beneficial effect on the training of digital personnel among young people. However, even if this factor is unchanged, the opposing factors of economic freedom and market freedom of the leading universities ensure full-scale training of the digital workforce among today's youth.

Table 27.3 Level of digital skills in society and economy in Russia and the Central Asian countries in 2017–2019, points 1–7

Source of classification	Country	2017	2018	2019 (y)	Trend (increase in 2019 compared to 2017), %
Britannica	Kazakhstan	4.60	4.65	4.69	1.96
	Kyrgyzstan	3.97	3.89	3.85	−3.02
	Uzbekistan	–	–	–	–
	Turkmenistan	–	–	–	–
	Tajikistan	–	4.46	4.44	–
UNESCO	Mongolia	3.73	3.74	3.78	1.34
	Afghanistan	–	–	–	–
	Iran	4.25	4.23	4.11	−3.29
	Pakistan	4.06	4.13	4.15	2.22
	India	4.38	4.63	4.43	1.14
	China	4.66	4.66	4.66	0.00
	Russia	4.62	4.82	4.95	7.14

Source Compiled by the authors based on the materials of World Bank (2021)

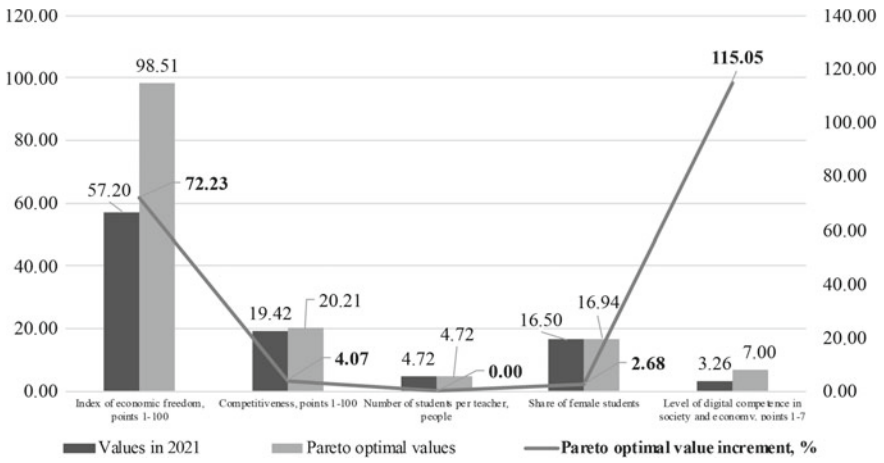

Fig. 27.1 Pareto optimum of full mastery of digital competencies through the factors of economic freedom and market freedom of universities. *Source* Compiled by the authors

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Chapter 28
Digital Learning as an Innovation in Higher Education and a Mechanism for Increasing Its Attractiveness to Young People

Vladimir S. Osipov, Sergei G. Vagin, Polina S. Frantsuzenko, Evgenii V. Frank, and Dmitry M. Kucheryavenko

JEL Codes J13 · O31 · O33 · O35 · P36 · P46

28.1 Introduction

In recent years, Russia and developing countries of Central Asia have seen a decline in the attractiveness of higher education among young people. The obtainment of full-time higher education among young people guarantees the training of highly qualified personnel stimulating competition in the labor market and meeting the needs of businesses in human resources.

The problem lies in the fact that the reverse order is becoming increasingly popular in Russia and Central Asia. This order involves the entry of personnel with medium and low qualifications into the labor market. These workers subsequently realize the shortage of competencies and receive extramural or evening higher education, mastering the missing competencies point by point. Nevertheless, they do not get a

V. S. Osipov (✉)
Moscow State Institute of International Relations (University) of the Ministry of Foreign Affairs Russian Federation, Moscow, Russia

S. G. Vagin
MIREA - Russian Technological University, Moscow, Russia

S. G. Vagin · P. S. Frantsuzenko
National Research University "Higher School of Economics", Moscow, Russia

P. S. Frantsuzenko
National Research Technological University "MISIS", Moscow, Russia

E. V. Frank · D. M. Kucheryavenko
Samara State Technical University, Samara, Russia

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broad education (i.e., they do not get high qualifications, despite some increase of qualifications compared to the preceding level).

As a result, there is an institutional trap in the labor market in which mid-skilled personnel receives the opportunities for career growth and access to higher (compared to other workers) incomes, while highly skilled personnel (university graduates) are deprived of these opportunities and cannot fully develop their potential. A natural consequence of this practice in the labor market is the declining attractiveness and demand for higher education among young people.

The relevance of overcoming the described institutional trap is high because the efficiency of the labor market and prospects for economic growth depends on it. The research hypothesis is the assumption that digital higher education can solve the identified problem. The paper aims to study digital learning as an innovation of higher education and a mechanism for increasing its attractiveness to young people in Russia and Central Asia.

28.2 Literature Review

Digital learning as an innovation in higher education has been extensively studied and presented in the available research literature, particularly in the works of Hashimi et al. (2021), Morozova et al. (2016), and Vicente et al. (2020). Experience and trends in the development of digital learning in Russia and Central Asia are revealed in the works of Drugova et al. (2021), Morozova et al. (2020), Popkova et al. (2020), Vanchukhina et al. (2019).

Despite the elaboration of individual components of the raised problem, it remains poorly studied and unresolved. Uncertainty about the impact of digital learning on the attractiveness of higher education for young people is a research gap that this research seeks to fill.

28.3 Materials and Methods

To study the experience of formation and development of digital learning as an innovation of higher education in Central Asia and Russia, the authors apply the case study method. This method was chosen because it provides a systematic view of digital learning practices in all Central Asian countries and overcomes the scarcity and fragmentation of statistical data.

Like other developing countries, a considerable part of Central Asia is not covered by official international statistics. Therefore, to quantify the level of development of digital learning in Russia and Central Asia, the authors use a common indicator of digitalization of the economy—the index of ICT use. To ensure that this indicator accurately reflects the level of the development of digital learning (to avoid false

interpretations of statistics in the absence of digital learning in practice), the authors conduct a case study.

The case review is followed by econometric modeling (on the form $y = F(x)$) of the impact of digital learning (its indicator is the index of ICT use, x) on the attractiveness of higher education for young people (its indicator is the proportion of young people who have received or are receiving higher education, y). To obtain the most accurate and reliable results, statistics are collected for each Central Asian country for 2013–2020, and arithmetic averages are calculated for all Central Asian countries for each period. Arithmetic averages are used to form time series for regression analysis.

The working hypothesis is considered proven in the case of a positive correlation of the marked indicators. The authors use the regression relationship established by the substitution method to determine the prospects for increasing the attractiveness of higher education among young people through the development of digital learning.

28.4 Results

The case study of Central Asian countries showed that these countries actively implement digital learning in higher education, especially in the context of the COVID-19 pandemic. Digital higher education in Central Asia is developed based on EdTech (World Bank, 2021a). For example, in Kyrgyzstan, students have free access to websites with educational content. Students and teachers are provided with SIM cards providing free access to educational apps and educational web pages and allowing them to use WhatsApp for free communication. Online lectures are held. There are also online educational platforms in Mongolia.

In Afghanistan, distance learning uses multimedia, video, and print media. Video lessons are broadcast on television and radio, and videos are broadcast via websites, portals, and social networks (Facebook and YouTube). Students have access to videos via memory cards and CDs; audio tutorials are provided via cell phones. The Ministry of Education of Afghanistan encourages universities to create educational videos.

There are numerous free digital e-learning platforms in India. Swayam platform provides 1900 full courses, including instructional videos, weekly assignments, and exams for higher education (undergraduate and graduate). The courses are aligned with the curriculum and include courses in engineering, humanities, social sciences, law, management, and robotics.

China has mobilized community resources to provide online courses and resources. More than 24,000 online courses are available to university students on 22 official platforms, most of which operate using artificial intelligence.

Numerous university Internet platforms for learning are operating in Russia. For example, Mail.ru provides access to its online learning platform, and GeekBrains provides free access to its programming courses. The Ministry of Education of the Russian Federation has developed guidelines for implementing distance learning technologies at all levels of education. It also opened a hotline to support regional ministries, schools, and institutions of higher education in organizing distance

learning. Instructions (including specific instructions for directors and teachers in the education system) on how to deal with the pandemic on a psychological level are also provided.

The Ministry of Science and Higher Education of the Russian Federation created a working group to help higher education institutions organize distance learning. Currently, all universities that report to the federal ministry (248) and almost 70% of all Russian universities have moved the educational process online. University 2035 (an online platform created by the Agency for Strategic Initiatives of the Russian Federation) also provides methodological support to universities. Universities share their experiences in advancing the educational process online on the Scienpolicy Telegram channel.

The results of the case study showed that digital learning is quite developed in Central Asia and occupies an essential place in the overall system of ICT use (Table 28.1).

The attractiveness of higher education among young people in Central Asia is illustrated by the data in Table 28.2.

Based on the data from Tables 28.1 and 28.2, the authors calculate their arithmetic averages (Fig. 28.1).

As shown in Fig. 28.1, the index of ICT use in Central Asia increases annually from 1.48 points in 2013 to 3.69 points in 2019 and 3.99 points in 2020. However, the share of young people enrolled in higher education in Central Asia has decreased in 2020 (38.16%) compared to 2019 (44.10%), which indicates the severity of the studied problem. A regression curve of the contribution of ICT use and university education of young people in Central Asia (based on data from Fig. 28.1) is shown in Fig. 28.2.

Table 28.1 Index of ICT use in Russia and Central Asia in 2023–2020 (x), points 0–7

Source of classification	Country	2013	2014	2015	2016	2017	2018	2019	2020
Britannica	Kazakhstan	3.00	3.70	4.30	4.50	5.20	5.70	5.90	6.00
	Kyrgyzstan	0.80	1.60	3.50	2.30	2.50	2.90	4.00	4.70
	Uzbekistan	0.60	1.90	2.10	2.10	2.10	2.10	2.10	4.60
	Turkmenistan	–	–	–	–	–	–	–	–
	Tajikistan	–	–	–	–	–	–	–	1.50
UNESCO	Mongolia	1.40	1.60	1.70	3.20	3.60	3.90	4.00	4.90
	Afghanistan	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.30
	Iran	2.00	1.10	1.40	2.20	2.70	3.50	5.00	5.30
	Pakistan	0.50	0.40	0.40	0.70	1.10	1.20	1.40	1.50
	India	0.60	0.70	0.70	0.90	1.30	1.60	2.10	2.50
	China	1.70	2.70	3.00	3.80	4.60	5.30	6.10	6.50
	Russia	4.00	4.30	5.00	5.50	5.90	6.10	6.10	6.10

Source Compiled by the authors based on the materials of World Bank (2021c)

Table 28.2 Share of young people who have received or are receiving higher education in Russia and Central Asian countries in 2013–2020 (y), %

Source of classification	Country	2013	2014	2015	2016	2017	2018	2019	2020
Britannica	Kazakhstan	50.44	48.80	46.37	46.62	50.15	53.99	61.75	70.68
	Kyrgyzstan	47.48	45.88	46.67	45.11	42.82	41.27	42.32	46.45
	Uzbekistan	8.09	8.10	8.22	8.46	9.18	10.08	12.58	15.92
	Turkmenistan	–	7.97	–	–	–	–	14.23	15.61
	Tajikistan	22.91	24.71	26.59	29.17	31.26	–	–	–
UNESCO	Mongolia	61.93	63.87	68.05	64.02	64.16	65.60	68.75	–
	Afghanistan	–	8.23	–	–	–	9.69	–	10.56
	Iran	59.28	67.32	72.96	69.64	68.12	62.79	60.39	58.22
	Pakistan	9.73	9.66	9.23	9.03	9.35	8.96	12.22	–
	India	23.79	25.43	26.77	26.83	27.44	28.06	28.57	29.44
	China	32.43	42.43	46.04	48.02	49.07	50.60	53.76	58.42
	Russia	77.85	78.46	79.94	80.63	81.91	84.58	86.40	–

Source Compiled by the authors based on the materials of World Bank (2021b)

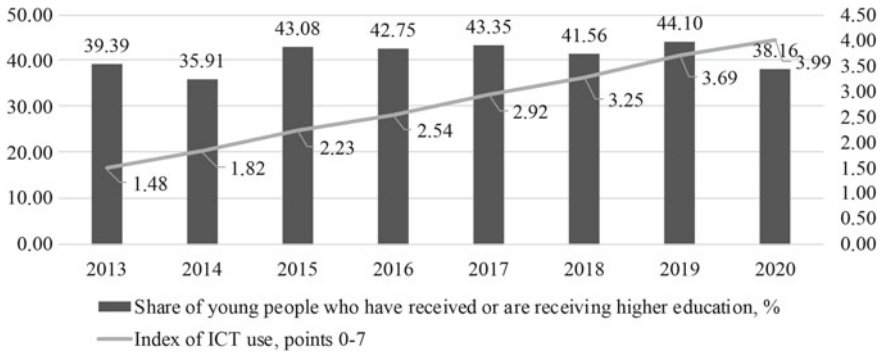

Fig. 28.1 Dynamics of ICT use and university education of young people in Central Asia (average estimate) in 2013–2020. *Source* Compiled by the authors

According to Fig. 28.2, with a one-point increase in the activity of using ICT, the proportion of young people enrolled in higher education in Central Asia increases by 0.983%. Based on the obtained regression equation (Fig. 28.2), it is revealed that if the index of ICT use increases to the maximum level (7 points, +75.40%), the proportion of young people covered by higher education in Central Asia will increase to 45.23% (+18.51%).

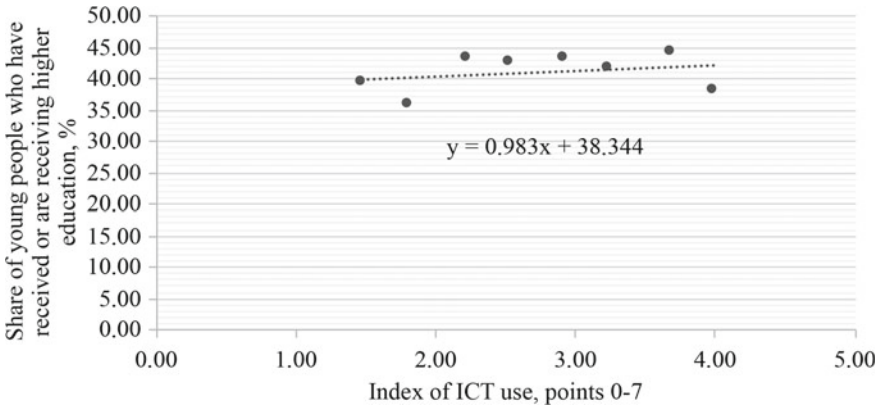

Fig. 28.2 Regression curve of the contribution of ICT use and university education of young people in Central Asia. *Source* Compiled by the authors

28.5 Conclusion

Thus, it is proved (the working hypothesis is proved) that digital learning, which is an innovation of higher education, acts as an efficient, highly effective, and affordable mechanism of increasing the attractiveness of higher education for young people in Central Asia. The assessment showed that the development of digital learning will increase enrollment of young people in higher education in Central Asia by 18.51% (from 38.16% in 2020 to 45.23%). This fact indicates the significant potential of digital learning and the feasibility of its scaling in Central Asia.

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Chapter 29
New Educational Requirements of Youth in the Digital Economy of the Future: Innovation and Risks Versus Stability and Return on Investment

Vladimir S. Osipov, Nikolai I. Berzon, Maksim M. Novikov, Maxim A. Korkin, and Stanislav O. Pityev

JEL Codes D81 · E22 · I23 · O35

29.1 Introduction

Central Asia and Russia actively develop their digital economies and introduce future technologies: artificial intelligence (AI), Big Data (BD), Internet of Things (IoT), and robots (Rb). Thus, according to IMD (2021), China is the most progressive Central Asian country. In 2021, China ranks 15th among the top 64 digital economies globally (84.431 points). China ranks 1st in the world in the use of robots in science and education and the proliferation of robots, and 11th in using Big Data and AI analytics.

V. S. Osipov (✉)
Moscow State Institute of International Relations (University) of the Ministry of Foreign Affairs Russian Federation, Moscow, Russia

N. I. Berzon
National Research University "Higher School of Economics", Moscow, Russia

M. M. Novikov
Diplomatic Academy of the Ministry of Foreign Affairs of the Russian Federation, Moscow, Russia
e-mail: Maxim@e-artteam.ru

M. A. Korkin · S. O. Pityev
SSEU-Samara State University of Economics, Samara, Russia
e-mail: korkinmo1@rambler.ru

S. O. Pityev
e-mail: pityevso@rambler.ru

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Kazakhstan ranks 32nd (66.066 points) in the World Digital Competitiveness Ranking. The country ranks sixth in the world in robot distribution. Russia is in 42nd place (60.271 points) in the same ranking. Russia ranks 7th in the world in the use of robots in science and education. India ranks 46th (55.126 points) in the World Digital Competitiveness Ranking. It ranks 12th in the world in using robots in science and education and 15th in robot distribution. Mongolia ranks 62nd (40.693 points) in World Digital Competitiveness Ranking.

To support the digital economy of the future, the governments of Central Asia and Russia encourage universities to train digital personnel skilled in breakthrough technologies. The problem lies in the uncertainty about the attractiveness of universities' educational programs on training the digital workforce of the future among youth. The country is interested in training young people in these educational programs because they are the most capable of mastering these programs because of their flexible thinking. The research question is how well these programs meet the new educational requirements of young people in the digital economy of the future.

The research purpose is related to identifying the new requirements of young people for education in the digital economy of the future and the consideration of these requirements when identifying the attractiveness of higher education programs on training digital personnel to work with breakthrough technologies among young people in Central Asia and Russia.

29.2 Literature Review

The high interest of the governments of Central Asia and Russia in the spread of advanced digital technologies is evidenced by the launch of relevant initiatives. China's national program "Made in China 2025" enshrines "the development of intelligent manufacturing processes, within which it is planned to create experimental intelligent enterprises and digital workplaces to apply technologies for human–machine interaction, industrial robots, intelligent logistics management, etc." (State Council of China, 2021).

The EAEU Development Strategy until 2025 served as the basis for launching a project for the synchronous development of digital technologies in science and education of EAEU member countries and increasing the general scientific potential of the Eurasian integration union. The project provides support for the universities of the EAEU member countries in the practical implementation of AI (Ministry of Economic Development of the Russian Federation, 2021). India hosts an Internet of Things exhibition, demonstrating the experience and development potential of the most high-tech enterprises in the country (Exhibition India Group, 2021).

Some of the preferences of young people are reflected in the existing publications on the topic of higher education for young people, particularly in the works of Al-Qadasi et al. (2021), Belenkova et al. (2019), Bisht and Pattanaik (2021), Gupta et al. (2021), Hasan et al. (2020), Kanios (2021), Morozova and Popkova (2014), and Naidoo (2021). Nevertheless, a systematic scientific understanding of the new

requirements of young people for education in the digital economy of the future has not yet been formed. This work aims to fill the identified gap.

29.3 Materials and Method

The authors conducted a review and comparative analysis of relevant statistics to identify common patterns and conditions of the involvement of youth in higher education in Central Asia and Russia. The authors apply the SWOT analysis to assess the attractiveness of higher education programs to train digital personnel to work with breakthrough technologies (artificial intelligence, Internet of Things, Big Data, and robots) among young people in Central Asia and Russia. The advantage of the chosen analytical methodology is that it allows the authors to confront innovation, risks of stability, and return on investment and most accurately establish the new requirements of young people to education in the digital economy of the future.

29.4 Results

To determine the extent to which young people in Central Asia in Russia are inclined and willing to express a preference for certain higher education programs, the authors turn to statistics reflecting the conditions of university education for young people (Figs. 29.1 and 29.2).

According to Fig. 29.1, Russia has the highest share of young people enrolled in universities immediately after secondary school (K12) among Central Asian countries (80.39%). The lowest share was observed in Turkmenistan (7.98%). The average

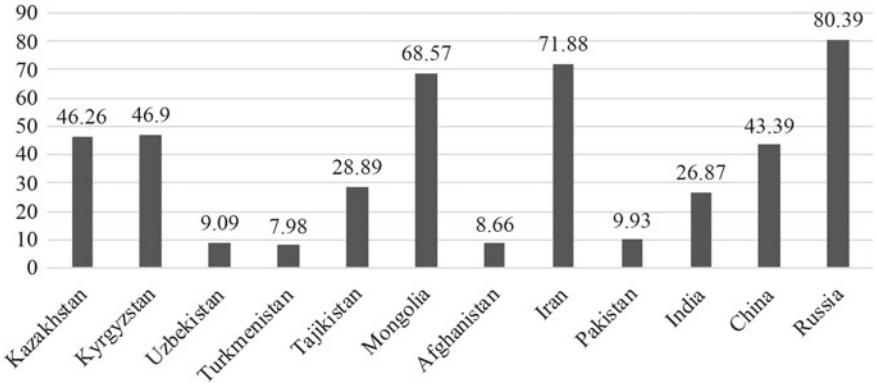

Fig. 29.1 Share of young people enrolled in universities immediately after graduation from secondary school (K12), %. *Source* Compiled by the authors based on the materials of Our World in Data (2021b)

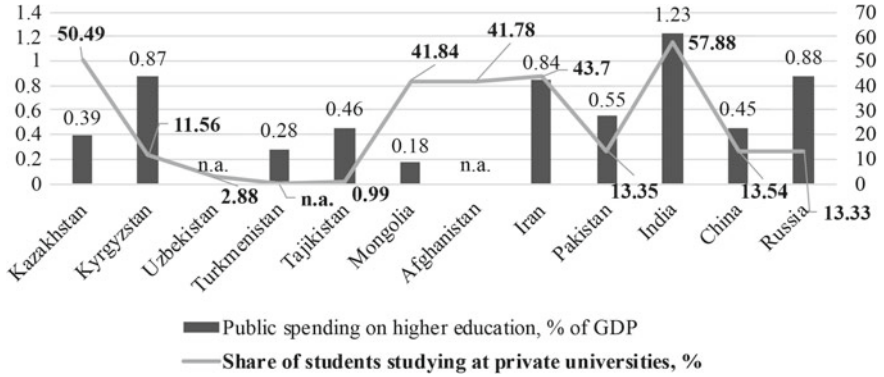

Fig. 29.2 Public spending on higher education and the share of students attending private universities. *Source* Compiled by the authors based on the materials of Our World in Data (2021a, 2021c)

share in Central Asia is 37.40%, indicating that higher education among young people is moderate.

According to Fig. 29.2, the highest public spending on higher education among Central Asian countries is observed in India (1.23% of GDP) and the lowest—in Mongolia (0.18% of GDP). This indicator averages 0.61% of GDP, indicating a relatively large amount of government funding for universities. Consequently, a significant proportion of young people study at universities on a budgetary basis and adjust to the conditions of state funding for their education, particularly the educational programs offered on a budgetary basis (where young people cannot dictate their requirements).

Figure 29.2 also shows that the proportion of students attending private universities is highest in India (57.88%) and Kazakhstan (50.49%), and lowest in Uzbekistan (2.88%). The average share for this indicator among Central Asian countries is 26.49%, which (unlike the rest of the youth population) can dictate their requirements for education programs at private universities.

Qualitative interpretation of the obtained quantitative results allows the authors to conduct a SWOT analysis of the attractiveness of higher education programs for training personnel to work with breakthrough technologies (AI, IoT, BD, Rb) among young people in Central Asia and Russia (Table 29.1).

According to the results of the analysis, the strengths (S) of higher education programs to train the workforce to work with breakthrough technologies (AI, IoT, BD, Rb) from the perspective of young people include exposure to advanced (prestigious) professions, training on budgetary places (and getting a scholarship), and long-term investment in training (strategic prospects for employment in the profession and a remote perspective of the obsolescence of competences).

Weaknesses (W) include limited employment opportunities in the profession (due to the lack of available jobs) and high risks of return on investment in training (including time costs).

Table 29.1 SWOT-analysis of the attractiveness of higher education programs to train personnel to work with breakthrough technologies (AI, IoT, BD, Rb) among young people in Central Asia and Russia

Strengths (S)	Weaknesses (W)
• Introduction to advanced (prestigious) professions; • Training on budgetary places; • Long-term investment in training	• Limited employment opportunities in the profession; • High risks of return on investment in training
Opportunities to overcome weaknesses (O)	Threats (T)
• Increased government funding; • Increase in knowledge-intensive jobs; • Guarantee of employment in the profession	• Shortage of knowledge-intensive jobs; • Filling knowledge-intensive jobs with experienced personnel through advanced training

Source Compiled by the authors

Opportunities to overcome weaknesses (O) involve the expansion of public funding (e.g., increased scholarships), creating knowledge-intensive jobs in the labor market, and increasing job security for university graduates. Threats (T) include a shortage of knowledge-intensive jobs and filling knowledge-intensive jobs with experienced personnel (rather than young people who graduated from universities) through advanced training.

29.5 Conclusion

The research allowed the authors to identify new requirements of young people for education in the digital economy of the future. Young people are not ready to take high risks in learning innovative educational programs and prefer stability and a high probability of return on investment in training. Growing government funding for higher education programs to train the digital workforce for breakthrough technologies (AI, IoT, BD, Rb) in Central Asia reduces the attractiveness of higher education for young people. The indicated problem can be solved by increasing the number of knowledge-intensive jobs (in the labor market) and providing guarantees of employment in the profession for university graduates.

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Chapter 30
Competitiveness of Youth as Digital Economy Workforce: Risk Profile and Risk Management Perspectives

Bogdan S. Vasyakin, Natalia A. Rykhtikova, Anastasia N. Mylnikova, Dmitry Yu. Denisov, and Dmitry A. Kamynin

JEL Codes E24 · J13 · J23 · J24 · J71 · J78 · J81

30.1 Introduction

The COVID-19 pandemic and crisis have exacerbated the problem of unemployment, which is especially high among young people in Central Asia and Russia. As of September 2021, youth unemployment is 3.7% in Kazakhstan, 34.7% in India (compared to 27.7% before the pandemic), and 23.6% in Iran (compared to 22.1% before the pandemic) (Trading Economics, 2021). The digital segment of the labor market is characterized by the highest level of competition because it represents the most prestigious, highly productive, highly paid, and knowledge-intensive jobs. The government order for the training of personnel for the digital economy is focused on young people and aims at their presence in this labor market segment.

The demand for human resources in the digital economy from businesses in this sphere is contradictory. On the one hand, companies need highly qualified personnel, which strengthens the position of young people in the digital segment of the labor market. On the other hand, Central Asian countries, like many other developing countries, experience a shortage of investment in the economy. Therefore, businesses in

B. S. Vasyakin (✉)
Plekhanov Russian University of Economics, Moscow, Russia
e-mail: Vasyakin.BS@rea.ru

N. A. Rykhtikova
Krasnogorsk Branch of Russian Presidential Academy of National Economy and Public Administration, Krasnogorsk, Russia

A. N. Mylnikova · D. Yu. Denisov · D. A. Kamynin
MIREA - Russian Technological University, Moscow, Russia
e-mail: Mylnikova@mirea.ru

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the digital economy are interested in reducing the cost of human resource management (HRM) and increasing its return, which makes experienced workers already involved in the digital economy quite attractive.

The problem lies in the uncertainty of the competitiveness of young people as a workforce in the digital economy (in the specified target segment of the labor market). The research question focuses on the prospects for employment in the digital profession among young people. In the context of crisis (pandemic) and high competition in the digital segment of the labor market, it is advisable to consider the competitiveness of young people as a workforce in the digital economy from the perspective of risks. This research aims to determine the competitiveness of young people as a workforce in the digital economy, compile a risk profile, and identify the prospects of risk management of the employment of youth in the digital segment of the labor market in Central Asia and Russia.

30.2 Literature Review

The issues of youth competitiveness in the labor market are widely represented in secondary scientific literature, particularly in the works of Assmann et al. (2021), Bannikova et al. (2019), Carter et al. (2021), Churchill and Khan (2021), Consiglio et al. (2021), Hartman et al. (2021), Popkova (2021), Smith et al. (2021), Sumberg et al. (2021), and Tunji-Olayeni et al. (2021). However, the literature review has revealed that the experience of Russia and Central Asian countries in the employment of digital youth in the digital segment of the labor market is studied insufficiently. This work aims to fill the identified gap.

30.3 Materials and Methods

This research assesses the competitiveness of young people as a digital economy workforce using the competitiveness polygon method. The chosen method allows the authors to conduct a quantitative multi-criteria assessment of the competitiveness of young people (university graduates) compared with the experienced personnel (employees of enterprises in the digital economy) and present the results visually—in the form of a diagram (competitiveness polygon).

Risk profile and risk management perspectives are determined using the risk mapping method. The advantage of the chosen method is that it allows to identify, systematize, and quantify risks. The authors conduct quantitative measurements of competitiveness and risks using the method of expert evaluations (the authors act as experts).

30.4 Results

Figure 30.1 presents the polygon of competitiveness of young people as a workforce in the digital economy compared with experienced workers.

According to Fig. 30.1, young people (8 points) are preferable to experienced workers (5 points) because they have a systematic (rather than selective) knowledge of digital competencies. Creativity and flexibility of thinking (as a basis for mastering new digital technologies) are much more pronounced among young people (10 points). The ability and readiness to master new digital competencies (lifelong learning) are also higher among young people (9 points).

However, young people have no work experience and knowledge of the features of industries in the digital economy (1 point), while their requirements for working conditions, salary, and career advancement are overestimated (1 point). Young people show low readiness to start working with digital technologies (5 points). Therefore, the integral competitiveness in the digital segment of the labor market is higher among experienced workers (41 points) than in young people (34 points). To identify the causes of the established phenomenon, the authors compiled a risk profile of the competitiveness of young people as a workforce in the digital economy (Table 30.1).

According to Table 30.1, the integral (total) level of risk of competitiveness of young people as a workforce in the digital economy is estimated at 8.6 points out of 20 possible (1.5 + 1.5 + 1.6 + 4.0), which is moderate but clearly pronounced. Based on the compiled risk profile, Table 30.2 reflects the prospects for the risk management of the competitiveness of young people as a workforce in the digital economy.

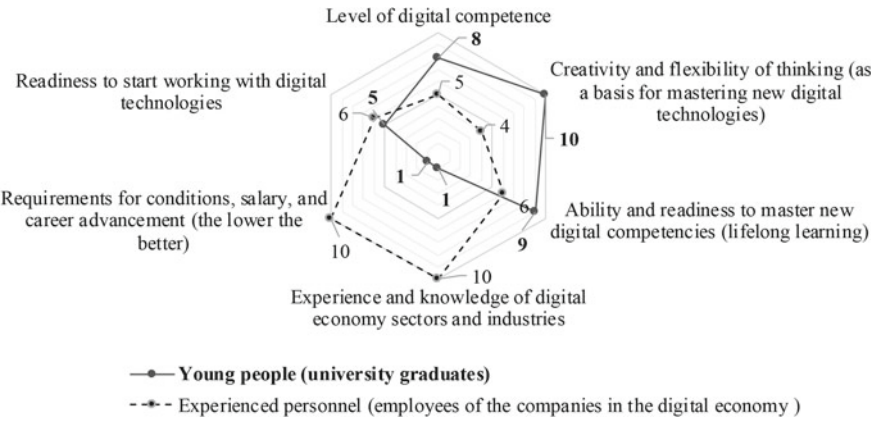

Fig. 30.1 The polygon of competitiveness of young people as a workforce in the digital economy compared with experienced workers, points 1–10. *Source* Compiled by the authors

Table 30.1 Risk profile of the competitiveness of youth as a workforce in the digital economy

Risk	Risk factor	Threat posed by the risk (degree of danger), points 1–5	Probability of risk occurrence, fractions from 1	Risk level (product of threat and probability), points 1–5
Mistakes of young people, deterioration of digital technology when working with it, and low efficiency and inappropriateness of using digital technology	Insufficient knowledge of applied digital competencies	Very high (5)	Low (0.3)	5 * 0.3 = 1.5
Failure of young people to provide benefits to the enterprise from using digital technology	Lack of working experience and knowledge of the features of industries in the digital economy	Moderate (3)	Moderate (0.5)	3 * 0.5 = 1.5
Losing position of young people in interviews with potential employers	High (sometimes exaggerated) demands for working conditions, salary, and career advancement	Low (2)	High (0.8)	2 * 0.8 = 1.6
Need for corporate training and investment in unlocking the human potential of young people	Low readiness to start working with digital technologies	High (4)	Very high (1.0)	4 * 1.0 = 4

Source Compiled by the authors

According to Table 30.2, the prospects of risk management of competitiveness of young people as a workforce in the digital economy are associated with the polysubjective management of the identified risks with the recommendations developed by the authors.

In managing the risk of mistakes made by young people, consequent deterioration of digital technologies, and low efficiency and inappropriateness of using digital technology, the subject of risk management is the enterprises of the digital economy, which provide insurance for the risks of hiring digital workforce among young people, mentoring, and supervision (which reduces the risk).

When managing the risk of the inability of young people to provide benefits for the enterprise from using digital technology, the subject of risk management is the

Table 30.2 Perspectives for the risk management of the competitiveness of young people as a workforce in the digital economy

Risk	Subject of risk management	Recommended risk management measures	Expected results of risk management
Mistakes of young people, deterioration of digital technology when working with it, and low efficiency and inappropriateness of using digital technology	Businesses in the digital economy	Insurance for the risks of hiring a young digital workforce, mentoring, and supervision	Reduction of risks
Failure of young people to provide benefits to the enterprise from using digital technology	Government (authorities regulating the labor market)	Tax support for businesses that hire digital workforce among young people	Reduction of risks
Losing position of young people in interviews with potential employers	Digital workforce among young people (university graduates)	Reducing demands on working conditions, salary, and career advancement	Overcoming of risks
Need for corporate training and investment in unlocking the human potential of young people	Universities preparing the digital workforce	Corporate training of the young digital workforce on favorable terms	Overcoming of risks

Source Compiled by the authors

government (authorities regulating the labor market), which provides tax support for businesses that hire young digital workforce (which reduces the risk).

In managing the risk of failing interviews with potential employers, the subject of risk management is young people (university graduates) who reduce their requirements for working conditions, salary, and career advancement (which contributes to overcoming the risk).

When managing the risk of the need for corporate training and investment in the human potential of young people, the subject of risk management is universities training the digital workforce, which carry out corporate training of digital workforce among young people on favorable terms (which contributes to overcoming the risk).

30.5 Conclusion

We can conclude that the competitiveness of young people as a workforce in the digital economy is moderate—it is lower than the competitiveness of experienced

workers. The risk profile identified four key risks to the competitiveness of young people as a workforce for the digital economy:

1. Mistakes of young people, deterioration of digital technologies, and inefficient and inappropriate use of digital technologies;
2. Failure of young people to provide benefits to the enterprise from using digital technology;
3. Losing position of young people in interviews with potential employers;
4. Need for corporate training and investment in unlocking the human potential of young people.

The prospects for risk management of competitiveness of young people as a digital economy workforce are associated with the polysubjective management of the identified risks through the recommendations developed by the authors. This process must involve enterprises of the digital economy, the government (authorities regulating the labor market), the young digital workforce (university graduates), and universities training the digital workforce.

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Chapter 31
Rethinking the Concept of Youth Through the Prism of New Trends in the Aging of Workforce in the Digital Economy of the Future

Aleksei V. Bogoviz, Galina N. Semenova, Olga A. Velikaya, Vladimir V. Lebedev, and Alexey K. Titov

JEL Codes J085 · J13 · J14 · J24 · J26

31.1 Introduction

In the digital economy, the problem of aging of the workforce is particularly acute. Researching this problem and finding a solution to it is now more relevant than ever. Aging of the workforce is the process of reducing the competitiveness of workers in their target segment of the labor market as their age increases. Traditionally, aging was triggered after the peak of labor activity. At the peak of labor activity, the employee is the most competitive in the target segment of the labor market because he or she possesses relevant competencies, work experience, and knowledge of the production

A. V. Bogoviz (✉)
Independent Researcher, Moscow, Russia

G. N. Semenova
Plekhanov Russian University of Economics, Moscow, Russia
e-mail: Sg6457@mail.ru

O. A. Velikaya · V. V. Lebedev
National Research Technological University "MISIS", Moscow, Russia
e-mail: velikaya.olga1@mail.ru

V. V. Lebedev
e-mail: zhenyashoxina.ru@mail.ru

V. V. Lebedev
PJSC "Quadra", Tula, Russia

A. K. Titov
Samara State Technical University, Samara, Russia
e-mail: alex8998@live.ru

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details. The peak of labor activity varies among workers but averages around 35–45 years of age. After this period, the employee's competencies gradually become obsolete, and the value of his or her work experience may decline due to changes in technology.

Scientific and technological progress has accelerated in the digital economy. Thus, competencies become obsolete much faster, just as rapidly as production technology changes. The peculiarity of the digital segment of the labor market is that the aging of human resources begins immediately after they arrive in this segment. This peculiarity of the digital segment of the labor market is more challenging for young people because university graduates do not have time to reach their peak labor activity and risk losing their competitiveness as a digital economy workforce in just a few years after graduation. Due to this reason, the age range of young people in the digital segment of the labor market is shifting.

Similar to other segments of the labor market in the digital segment, young people expect their high competitiveness over a long period. However, this often does not happen in practice—competitiveness is lost much faster. In this regard, it is advisable to revise the concept of youth, considering the peculiarities of the aging of human resources in the digital segment of the labor market. The paper aims to reconsider the concept of youth in Central Asia and Russia through the prism of new trends in the aging of human resources in the digital economy of the future.

31.2 Literature Review

The existing literature, in particular the works of Castillo-Carandang et al. (2020), Essex and Melham (2019), Freidus et al. (2020), Harris et al. (2021), Ketko et al. (2020), Ko et al. (2019), Lee et al. (2020), Li and Tai (2016), Marini (2018), Popkova et al. (2017), Poplawski-Ribeiro (2020), Prenzel and Iammarino (2021), Shah et al. (2020), and Van der Heijden et al. (2021), consider young people as the subject of the labor market in terms of age. Nevertheless, these works do not consider the peculiarities of the digital economy, which causes a distorted interpretation of young people in the digital segment of the labor market.

New trends in the aging of human resources in the digital economy of the future are insufficiently addressed in the available literature and not clearly defined, which is a research gap. The identified gap is filled in this paper, which allows us to reconsider the concept of youth in the digital economy.

31.3 Materials and Method

The methodological basis of this research consists of general scientific methods, including induction, deduction, analysis, and synthesis. The authors carry out the collection, review, and systematic analysis of relevant statistics on the research topic

and critically reconsider it. This research explores the current case studies of the aging of human resources and their competitiveness in the labor market in Russia's digital economy, which are universal and reflect the status quo in other Central Asian countries.

31.4 Results

A systematic review and critical analysis of the labor markets of Central Asia and Russia revealed the following new trends in the aging of human resources in the digital economy of the future. The first trend is the rapid obsolescence of competencies and the need for lifelong learning. According to the estimates given by the Institute of Statistical Research and Knowledge Economics of the National Research University Higher School of Economics, the Ministry of Digital Development, Communications, and Mass Media of the Russian Federation, and the Federal State Statistics Service of the Russian Federation (Abdrakhmanova et al., 2021), only a small fraction of the Russian population (over the age of 15) has mastered relevant digital skills.

The most common skill is working with a word processor (this skill is mastered by 40.4% of the population). Quite common skills are the use of e-mail (39.7%), copying files (36.3%), and file sharing (31%). Rare skills are connecting and installing new digital devices (15.3%), creating electronic presentations (9%), and setting up software (5.8%). Unique skills are installing an operating system (2.9%) and programming (1.2%).

Notably, these statistics reflect only the basic digital skills required in the digital economy. The digital segment of the labor market sees the emerging and growing need for more advanced competencies, including cloud storage of information, the creation and processing of Big Data, and implementation of other advanced technologies (e.g., artificial intelligence).

The digital economy markets constantly adopt more sophisticated and advanced technologies. Accordingly, there is a need for new competencies related to the mastery of these technologies. It requires continuous lifelong learning. The unwillingness of employees to learn new competencies and continue their training indicates the obsolescence of these employees as a workforce (and their decreased competitiveness) in the digital segment of the labor market.

The second trend is the growing need for loyalty to new technologies and their mastery, which requires special professional and personal competencies. The materials of the Institute of Statistical Research and Knowledge Economics of the National Research University Higher School of Economics, the Ministry of Digital Development, Communications, and Mass Media of the Russian Federation, and the Federal State Statistics Service of the Russian Federation (Abdrakhmanova et al., 2021) pay considerable attention to robots. It is noted that in Russia, 63% of the population (aged 18–65 years) are currently afraid of robots and show low loyalty to them.

The willingness to use a robotic assistant at work was expressed by 44% of the population. Simultaneously, 74% of the population believe that robots will lead to the disappearance of several professions in the future, and 55% believe that robots will displace people from most jobs. Also, 4% assume that robots will fully fill managerial positions in the digital economy, and 30% believe that robots will fill managerial positions partially.

Consequently, Russian workers are aware of the growing competition from robots but show psychological unpreparedness to use them in their professional activities. The digital economy of the future may see the launch of practices in which robots lead the human workforce. Evidently, the aging human resources will be unprepared to work in such a team. Thus, they will demonstrate low loyalty to technological innovation. On the contrary, young people will be interested in robots and will take the opportunity to use them in practice.

It is important to note that openness to technical innovation does not mean the absence of cybersecurity concerns. The young digital workforce is not a workforce that mindlessly strives for everything new, but the one that understands cyber risks and can manage them in a highly effective manner, ensuring the safety of themselves and those around them. Therefore, the young digital workforce has a unique set of professional (e.g., robotics skills) and personal (e.g., psychological readiness to work side-by-side with robots) competencies, while the aging workforce does not fully have these competencies.

The third trend is an increase in the state pressure on the labor market in terms of stimulating employment and promoting young people with legal and regulatory consolidation of age limits of this social group. The materials of the Institute of Statistical Research and Knowledge Economics of the National Research University Higher School of Economics, the Ministry of Digital Development, Communications, and Mass Media of the Russian Federation, and the Federal State Statistics Service of the Russian Federation (Abdrakhmanova et al., 2021) keep separate statistics on the employment of ICT specialists (digital workforce) under the age of 35 in the ICT-intensive professions (i.e., the digital segment of the labor market).

The age under 35 is the official age requirement for digital cadres to qualify as young people. Similar requirements for the age of participants are imposed for state funding of scientific teams (grant support of scientific research). It is noteworthy that in Russia, the digital segment of the labor market is dominated by the digital workforce aged 30–39 (37.7%) and 15–29 (30.4%). Consequently, there is a clear age limit for the young digital workforce established by the influence of state requirements and objective reasons (i.e., possession of the necessary competencies).

It is critical to note that there is no lower age limit, which allows including minors in the workforce of the digital economy (in Central Asia and Russia, minors are considered to be under 18 years old). Although the last (third) trend is set by the government, this does not mean its increased importance. On the contrary, the first two trends are more critical because they reflect the market demands for a digital workforce among young people.

The reconsideration of the concept of youth through the prism of the new trends of aging in the digital economy of the future allowed us to identify the following modern criteria of youth:

- Mastery of current digital competencies and a propensity to learn new competencies;
- Loyalty to advanced technologies and willingness to use them;
- Compliance with state requirements for young people (being under the age of 35).

These criteria outlined the circle of the social category "youth" in the digital segment of the labor market. They also demonstrated the narrowness of this circle and its fundamental difference from the traditional notion of youth (defined exclusively by age criteria).

31.5 Conclusion

The authors have identified three new trends of aging in the digital economy of the future. The first trend is the rapid obsolescence of competencies and the need for lifelong learning. The second trend is the growing need for loyalty to new technologies and their mastery, which requires special professional and personal competencies. The third trend is an increase in the state pressure on the labor market in terms of stimulating employment and promoting young people with legal and regulatory consolidation of age limits of this social group.

New trends dictate the need to revise the concept of youth. The criteria for the concept of youth in the digital economy of the future should include the possession of relevant digital competencies and inclination to learn new competencies, loyalty to advanced technologies and willingness to use them, and compliance with state requirements for young people (under the age of 35). The official statistics and the case studies of Russia (which can be extended to other countries of Central Asia) have shown that only a small percentage (less than 1%) of workers in the labor market meet three criteria simultaneously and can, therefore, be considered young people in the digital segment of the labor market.

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Chapter 32
Innovative Development of Education in the Digital Economy of the Future for Young People: Distance Learning Versus Smart Technologies in Education

Veronika V. Yankovskaya, Mikhail Yu. Zakharov, Aleksandr N. Abramov, Valentina Yu. Dianova, and Vera V. Dvoretskaya

JEL Codes O31 · O32 · O33 · O38 · J13

32.1 Introduction

Nowadays, two vectors of innovative development of higher education in the digital economy have taken shape and are being successfully implemented in international practice. Both vectors are presented in Central Asia and Russia. Initially, these vectors were launched for the benefit of experienced personnel. The first vector is distance learning. Its advantage over pre-digital forms of education (i.e., full-time, part-time, and evening education) are the most favorable opportunities for combining work and study with the possibility of training on a flexible individual schedule.

V. V. Yankovskaya (✉)
Plekhanov Russian University of Economics, Moscow, Russia
e-mail: veronika28-2@mail.ru

M. Yu. Zakharov
State University of Management, Moscow, Russia

A. N. Abramov
Moscow Region State University, Mytishi, Russia
e-mail: alex_nic_abramov@mail.ru

V. Yu. Dianova
Russian University of Cooperation, Mytishi, Russia
e-mail: dianovavu@yandex.ru

V. V. Dvoretskaya
Financial University Under the Government of the Russian Federation, Moscow, Russia

E. G. Popkova and B. S. Sergi (eds.), *Digital Education in Russia and Central Asia*,
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The second vector is smart technologies (e.g., robots and virtual and augmented reality technologies) in higher education (EdTech). The use of these technologies represents an innovative approach to mastering applied competencies. This vector was introduced to provide point-to-point filling of gaps in the applied competencies of experienced personnel in the labor market with the help of high-tech (smart) simulators used in practical classes at universities.

The rapid aging of the workforce in the digital economy actualizes the reorientation of innovative development of higher education to young people. This trend raises the research question about the contribution of each vector of innovation in the digital economy of the future to higher education of student youth. Moreover, it is necessary to determine which of these vectors is more relevant to the interests of young people. To find the answers to these research questions, this paper aims to identify the prospects of innovative development of higher education in the digital economy of the future for young people in Central Asia and Russia by contrasting (and comparing) distance learning with smart technologies in higher education.

32.2 Literature Review

The literature review demonstrated that innovations in digital higher education, both distance learning and smart technologies of higher education are discussed in the publications of Buchanan (2020), de Paula (2021), Jordan et al. (2021), Laufer et al. (2021), Macgilchrist (2021), McStay (2020), Morozova et al. (2021), Popkova et al. (2021), Popkova and Sergi (2020), Vanchukhina et al. (2018), and Witzenberger and Gulson (2021).

Simultaneously, the gap analysis revealed the blind spots of the existing knowledge system in digital higher education. The first gap is related to the lack of clarity about the significance of the innovation vectors of higher education in the digital economy of the future for the university education of young people. The second gap lies in the poorly studied experience of innovative development of digital higher education in Russia and the countries of Central Asia. This study aims to fill the identified gaps.

32.3 Materials and Methods

Taking into account both vectors (i.e., distance learning and smart technologies in education), the authors use the case method to qualitatively describe the practices of the innovative development of higher education for young people in the digital economy of the future in Central Asia and Russia. Moreover, the authors apply the method of regression analysis to determine the impact of the number of official international distance learning programs (x_1) and smart technologies (robots) in education (x_2) on the place in the global ranking of higher education (y). The authors construct regression curves.

32.4 Results

According to Colombia Education (2021), the innovative development of higher education in the digital economy of Central Asian countries is quite developed and considered one of the most progressive in the world. Thus, India is ranked as the second most innovative country in the world in terms of digital education because it has a growing number of world-class universities offering online programs that are very popular with young students. Although pre-digital forms of higher education predominate, distance learning is also very popular and generates significant revenues for Indian universities. Indian universities offer international distance learning programs in collaboration with leading American universities: Carnegie Mellon University, Massachusetts Institute of Technology, and Cornell University.

China is ranked third in Colombia Education rating (2021). There are hundreds of different online university programs in China, and their number is growing every year. China has always supported the concept of distance education; in the 1960s, courses were conducted via television and radio. Further growth of distance learning in China is predicted in the decade of action, which will ensure the sustainable development of digital higher education in China. Distance learning allows attracting young people to universities.

The Higher School of Economics (2021) also notes that EdTech is a priority area for cooperation between Russia, the EAEU, and the ASEAN countries. In 2021, the RBC Rating (2021) of the top five largest EdTech companies in Russia included the following companies:

- "Skyeng" online English language school;
- "Netology Group" (educational center "Netology" providing training in digital professions and online school "Foxford" providing training for schoolchildren from the 5th to the 11th grade);
- "iSpring" developing software for corporate training;
- "MAXIMUM Education," which provides additional online education for schoolchildren;
- "Umney"—distance learning portal in Russia and abroad.

The described case studies show that both vectors of innovative development of digital higher education contribute to making university education more popular, accessible, and attractive for young people in Central Asia and Russia. Let us turn to official statistics to conduct a comparative analysis of the two studied vectors (Fig. 32.1).

According to Fig. 32.1, China (22nd place) and Russia (23rd place) show the best position in the global ranking of higher education among Central Asian countries in 2021. The most significant number of official international distance learning programs is observed in China (105 programs). The application of smart technologies (robots) in higher education is most developed in China (1st place in the world). The authors used the statistics shown in Fig. 32.1 to construct regression curves of

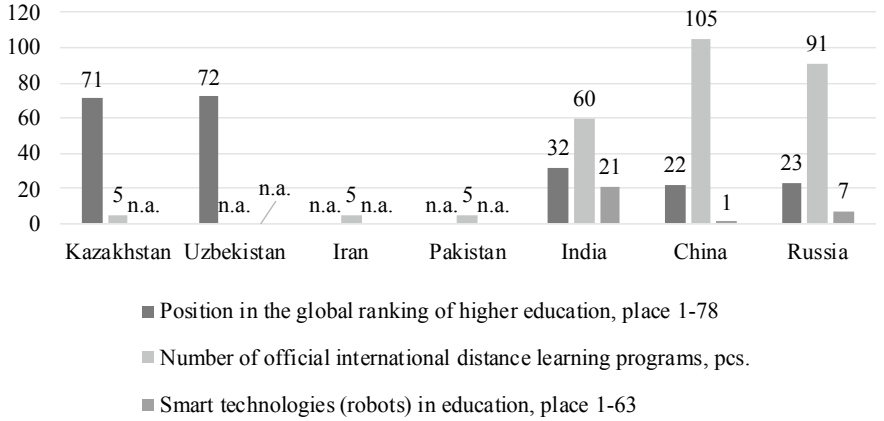

Fig. 32.1 Statistics on the innovative development of digital higher education in Central Asia and Russia in 2021. *Note**n.a.—the data is missing from the source. The regression analysis will assign the worst possible values to the indicators in the sample countries for which there are no data. *Source* Compiled by the authors based on the materials of Distance Learning Portal (2021), World Population Review (2021), IMD (2021)

the contribution of the vectors of innovative development of digital higher education to the university education of young people in Central Asia and Russia in 2021 (Fig. 32.2).

According to Fig. 32.2, when the number of official international distance learning programs increases by one program, the position in the global ranking of higher education improves by 0.5049 (the correlation is high: 93.88). When the position in the ranking of development of smart technologies (robots) in higher education improves by one place, the position in the global ranking of higher education improves by 0.5253 places (correlation is high: 95.83%).

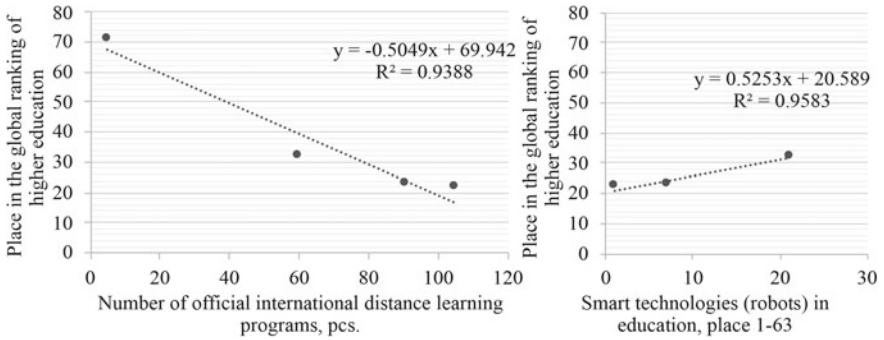

Fig. 32.2 Regression curves of the contribution of innovation vectors of digital higher education to university education of young people in Central Asia and Russia in 2021. *Source* Compiled by the authors

Consequently, both vectors of innovative development of digital higher education in Central Asia and Russia contribute significantly (and equally) to making higher education more attractive, accessible, and popular among young people. Therefore, it is advisable to support and develop both studied vectors in the digital economy of the future.

32.5 Conclusion

The conducted research provided the following results:

1. It was found that both vectors of innovative development of digital higher education among the countries of Central Asia are most pronounced in China, which ranks 1st in the world in terms of the development of smart technologies (robots) in higher education, provided the largest number of official international distance learning programs (105 programs), and has the best position in the global ranking of higher education (22nd place);
2. It was revealed that (based on a broad and comprehensive study of case experience) all countries of Central Asia and Russia use both vectors of innovative development of digital higher education (i.e., distance learning and smart technologies in education) not only for experienced personnel in the labor market (as initially assumed) but also for young people;
3. Based on the analysis of official international statistics, it is proved that distance learning and smart technologies in education make almost identical, positive, and pronounced contributions to the popularization of university education among young people in Central Asian countries and Russia.

Thus, instead of choosing between the two vectors of innovative development of digital higher education available and successfully implemented in Russia and the countries of Central Asia, it is recommended to provide systematic support for the implementation of both vectors. Distance learning increases the accessibility and convenience of higher education for young people. In turn, smart technology in higher education allows for better mastery of applied competencies. The comprehensive implementation of both vectors of innovative development of digital higher education will increase the competitiveness of young people in the digital segment of the labor market and slow down the aging of the workforce in Central Asia and Russia.

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Chapter 33
Innovative Approach to Educating Young People in the Regional Education Market in the Context of the Digital Economy of the Future

Veronika V. Yankovskaya, Murat A. Bulgarov, Irina V. Gimelshtein, Maria E. Konovalova, and Olga Yu. Kuzmina

JEL codes I23 · I25 · N95 · O18 · O32 · O33 · P25 · P48 · R23 · R58

33.1 Introduction

Like most other developing countries, Central Asia and Russia are characterized by a clear division between metropolitan universities (which receive the most significant government support and have the greatest development opportunities) and regional universities (which lack government support and lag in development). This fact creates a gap between the capital and the regions and causes an imbalance in the development of higher education in Russia and Central Asian countries.

For example, among Russian universities in the QS ranking (2021), there are primarily universities from the capital (Lomonosov Moscow State University, Moscow Institute of Physics and Technology, Bauman Moscow State Technical University, HSE University, etc.) with only a few regional universities, including Novosibirsk State University and Tomsk State University. As a result, regional universities do not realize their development potential, and regions face a disequilibrium of the labor market and slow economic growth.

V. V. Yankovskaya (✉)
Plekhanov Russian University of Economics, Moscow, Russia

M. A. Bulgarov
Kuban State Agrarian University Named After I.T. Trubilin, Krasnodar, Russia

I. V. Gimelshtein
Irkutsk National Research Technical University, Irkutsk, Russia

M. E. Konovalova · O. Yu. Kuzmina
SSEU-Samara State University of Economics, Samara, Russia

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The emergence of the digital economy dramatically reduces the development gap between the regions and allows achieving a balanced development of the regional economies of Central Asia and Russia. However, the digital progress of the regions only slightly extends to the sphere of higher education (and is mainly focused on industries, the social sphere, etc.). The education of youth, which is the foundation of the contribution of universities to regional economic development, currently involves limited use of the capabilities of advanced digital technology.

The problem lies in the fact that the current approach to educating young people in the regional education market does not reveal the potential for the development of universities and their contribution to the economies of Central Asia in conditions of the digital technological order. This research aims to form a scientific and methodological basis for solving the indicated problem by developing an innovative approach to training young people in the regional education market under the conditions of the digital economy of the future. The research novelty lies in developing recommendations on using digital higher education opportunities for the university education of young people in the regional market of educational services.

33.2 Literature Review

The traditional approach to the education of young people in the regional education market in Central Asia and Russia, its essence, characteristics, and shortcomings are outlined in the works of such researchers as Budzinskaya (2021), Cheglakova et al. (2020), Debnath et al. (2020), Ivanova et al. (2021), Jiang et al. (2021), Koroleva and Kuratova (2020), Leskina and Sabzalieva (2021), Marques et al. (2020), Mok et al. (2020), Morozova et al. (2020), Popkova et al. (2020), Sergi et al. (2019), and Zhang and Adamson (2020).

Nevertheless, the available scientific literature does not identify the prospects for improving the approach to educating young people in the regional education market in Central Asia and Russia and does not disclose the possibilities of the digital economy in higher education. This work aims to fill the identified research gap.

33.3 Materials and Methods

To develop an innovative approach to the training of young people in the regional market of educational services in the digital economy of the future, this research applies the method of logical analysis, which allows identifying the cause–effect relations of the development of digital higher education in the countries of Central Asia and Russia. The graphical method is used to represent the author's approach visually.

To substantiate the advantages of the innovative approach to educating young people in the regional education market in the digital economy of the future in

Central Asia as compared to the traditional approach, the authors apply the method of comparative analysis, which allows contrasting the two approaches by a variety of comparative criteria that indicate the differences between them.

33.4 Results

The innovative approach to educating young people in the regional education market in the digital economy of the future developed specifically for Central Asia and Russia is visualized in Fig. 33.1.

Figure 33.1 showed several features of the innovative approach to the training of young people in the regional education market under the conditions of the digital economy of the future.

The first feature is the attraction of students to regional universities from other regions and partner countries in Central Asia and Russia. This feature is achieved through the international recognition of diplomas, the provision of dual degrees, and the digital marketing of regional universities in Central Asia and Russia.

The second feature is the increased scientific and labor mobility of teachers at regional universities in Central Asia and Russia. The exchanges of students and teachers are becoming a normative practice. Teachers can intern and share experiences through a partner network of regional universities in Central Asia and Russia.

The third feature is the increased attractiveness of higher education among young people in the regions of Central Asia and Russia through the use of progressive educational technologies (distance learning and EdTech).

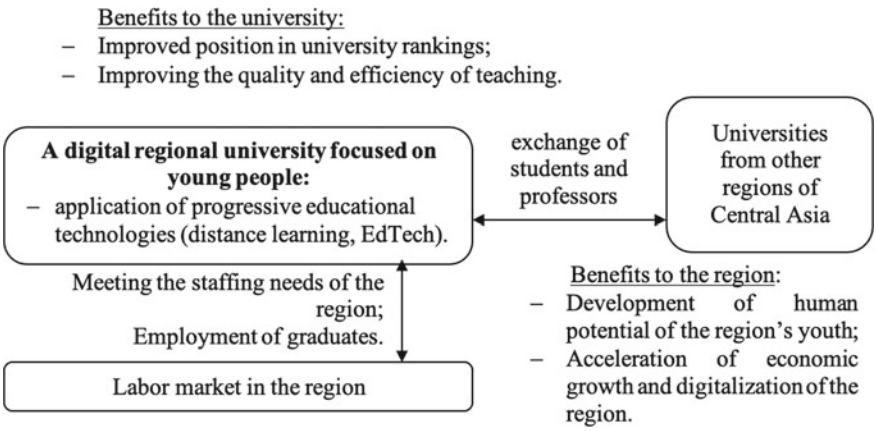

Fig. 33.1 Innovative approach to educating young people in the regional education market in the digital economy of the future. *Source* Developed by the authors

The fourth feature is the digital connection to the labor market of regional universities in Central Asia and Russia. Electronic partnership with enterprises of the digital economy in the region provides a guarantee of employment of young people (university graduates), a flexible update of training areas for the economy of the region, considering changes in the labor market, and the improved mastering of applied competencies demanded in the region through internships at partner companies.

The benefits of an innovative approach to educating young people in the regional education market in the future digital economy for regional universities in Central Asia and Russia include improved positions in university rankings and improved quality and efficiency of training. The benefits for the regions are related to the development of the human potential of the youth and the acceleration of economic growth and digitalization in the regions.

Digital higher education in the countries of Central Asia and Russia is the basis of the noted advantages. A comparative analysis of the traditional and innovative approach to educating young people in the regional education market in the digital economy of the future in Central Asia is carried out in Table 33.1.

According to the results of the comparative analysis in Table 33.1, under the traditional approach, the universities have the third technological mode (pre-digital),

Table 33.1 Comparative analysis of traditional and innovative approaches to the education of youth in the regional education market in the digital economy of the future in Central Asia

Comparison criterion	Traditional approach	Innovative approach
Technological mode of the university	Third (pre-digital)	fourth (digital)
Territorial boundaries of the category of consumers among young people	"Narrow": only the youth of the region	"Broad": including young people from other regions of Central Asia
Teachers	Only from the region	Include teachers from other regions of Central Asia
Educational programs	Do not consider the best practices and do not harmonize with the labor market	Consider the best practices and harmonize with the labor market
Employment of graduates (young people)	Not guaranteed	Guaranteed
Training opportunities for the digital workforce	Minimal	Full scale
Applied educational technologies	Pre-digital	Digital (distance learning, EdTech)
Opportunities for increasing the university's competitiveness	Severely limited	Significantly expanded
Contribution of the university to the regional economy	Low contribution	Significant contribution

Source Developed by the authors

and, under the innovative approach, the universities have the fourth technological mode (digital). The territorial boundaries of the category of consumers among young people in the traditional approach are "narrow" (including only the youth of the region). In the innovative approach, the territorial boundaries are "broad" and include young people from other regions of Central Asia.

In the traditional approach, the teaching staff of universities is formed from scholars only from the region. In the innovative approach, the teaching staff of universities includes teachers from other regions of Central Asia. In the traditional approach, educational programs do not consider the best practices and do not harmonize with the labor market. Under the innovative approach, educational programs are developed based on the best practices and, therefore, harmonize with the regional labor market.

The employment of graduates (young people) is guaranteed only with the innovative approach. The innovative approach also provides greater opportunities for digital training. The educational technologies used in the traditional approach are predigital, while the innovative approach uses digital educational technologies (distance learning, EdTech). The opportunities to increase the university's competitiveness under the traditional approach are severely limited, and under the innovative approach are significantly expanded. The contribution of the university to the region's economy with an innovative approach is much more pronounced.

33.5 Conclusion

Thus, the developed innovative approach to training young people in the regional education market in the digital economy of the future relies on the advanced capabilities of digital higher education. The peculiarities of the author's approach are as follows:

1. Attracting students from other regions and partner countries in Central Asia and Russia to regional universities;
2. Increased scientific and labor mobility of teachers of regional universities of Central Asia and Russia;
3. Increased attractiveness of higher education among young people in the regions of Central Asia and Russia based on the use of progressive educational technologies (distance learning, EdTech);
4. Digital connection to the labor market of regional universities in Central Asia and Russia.

The proposed approach allows increasing the attractiveness of higher education among young people in the regions of Central Asia and Russia, increasing the competitiveness of regional universities, and providing a balanced development of the regional economy of Central Asia. The benefits for regional universities in Central Asia and Russia include improved positions in university rankings and improved quality and efficiency of teaching. The benefits for the regions are related to the

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Chapter 34
Training of Today's Youth for the Digital Economy of the Future: Social Adaptation or Modernization of Education

Bogdan S. Vasyakin, Yulia S. Lisachkina, Rais Kh. Mutolapov, Alexander V. Ivanchenkov, and Artem A. Nikolaev

JEL Codes H52 · I22 · I23 · I28 · N35 · O33 · O53

34.1 Introduction

In Central Asia and Russia, the digital growth of the economy is hampered by a shortage of digital personnel, whose training is based on university education for young people. With a generally high level of the development of higher education, these countries face the challenge of training the workforce for the digital economy. According to IMD (2021), in 2021, China is the 13th in the world in terms of training personnel but only 16th in the training of the workforce for the digital economy. Similarly, Russia is 42nd in the world in terms of training personnel and only 49th in the training of workforce for the digital economy. Mongolia ranks 17th in the world in the training of personnel and only 55th in the training of the workforce for the

B. S. Vasyakin (✉)
Plekhanov Russian University of Economics, Moscow, Russia
e-mail: Vasyakin.BS@rea.ru

Y. S. Lisachkina · R. Kh. Mutolapov · A. A. Nikolaev
National Research Technological University "MISIS", Moscow, Russia
e-mail: lisachkina111@rambler.ru

R. Kh. Mutolapov
e-mail: mutolapovr@rambler.ru

A. A. Nikolaev
e-mail: nikolaevaa11@rambler.ru

A. V. Ivanchenkov
National Research University "Higher School of Economics", Moscow, Russia
e-mail: ivanchenkovav@rambler.ru

E. G. Popkova and B. S. Sergi (eds.), *Digital Education in Russia and Central Asia*,
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digital economy. Kazakhstan is 22nd in terms of training of personnel but only 50th in training for the digital economy.

Today's youth can be trained for the digital economy of the future through two alternative measures. The first measure is social adaptation. It allows restructuring social institutions and the labor market for the new digital context. The restructuring is a measure to stimulate the demand of young people to master the professions of the digital economy. The second measure is the modernization of education. It aims to increase the flexibility of universities and align them with the new realities of the fourth technological mode. This is a measure to encourage universities to offer higher education services to train young people for the digital economy.

The paper aims to determine what (social adaptation in terms of the demand or modernization of education in terms of the supply) is needed for full-scale training (overcoming the deficit) of today's youth for the digital economy of the future in Central Asia and Russia and to develop framework recommendations for this issue.

34.2 Literature Review

The issues of training of today's youth for the digital economy are considered in numerous scientific works, such as Budzinskaya (2021), Capogna (2020), Cocorullo and Giacomini (2020), Corrales et al. (2019), Dorschel (2021), Popkova and Sergi (2020), Sowa and Przegalinska (2020), and Vanchukhina et al. (2019). Nevertheless, measures of social adaptation and modernization of higher education and the need for their application to train the digital economy workforce among today's youth are studied insufficiently. This research aims to fill the identified gap.

34.3 Materials and Methods

To determine the need for the application of the measures of social adaptation and modernization of higher education, the authors review and analyze the materials of sociological surveys conducted by the Russian Public Opinion Research Center (VCIOM) in 2019–2021. These surveys reflect the current context of training of today's youth for the digital economy in Russia, which can be extended to the remaining countries of Central Asia.

Based on the systematization and critical reconsideration of survey materials and using the method of expert assessments (the authors of this work are the experts), the authors determine (using various criteria) the degree of compliance of supply and demand in the higher education market with the real needs of training of today's youth for the digital economy of the future in Central Asia and Russia.

34.4 Results

A review and systematization of available survey materials have yielded several results of the analysis of the context of training of today's youth for the digital economy in Russia (as well as in other Central Asian countries, given its exemplary and universal experience).

First, it is established that there is a fairly high demand for the digital economy workforce in the labor market, which determines the possibility of their employment in a mastered profession. Thus, VCIOM (2021b) noted that 31% of Russian enterprises have already implemented such advanced digital technology as artificial intelligence (AI), and 23% of enterprises have planned to implement this technology in the coming years. The experience of implementing AI is positive—82% of the companies that use it note an increase in their efficiency.

Second, there is a shortage of staff for the digital economy. It was indicated by 69% of enterprises. Among enterprises planning to implement AI, this share is higher and amounts to 83%. Consequently, the shortage of human resources in the digital economy hinders the introduction of AI. Simultaneously, only 28% of enterprises are willing to train their employees (VCIOM, 2021b), which means that they rely on the university training of young people.

Third, young people have a moderate readiness to learn professions in the digital economy—50% are interested in taking AI technology training (VCIOM, 2021a). According to VCIOM materials (2021c), the use of information and communication technology (4.06 points out of 5) is among the competencies that employers demand most. Digital competencies are possessed by 62% of the population; 32% have a high level of proficiency, and 30% have an above-average level. The lack of necessary qualifications of job applicants is perceived by 20% of employers as the main problem of the digitalization of their enterprises.

Based on the above, the authors estimate the degree of compliance of supply and demand in the higher education market with the real needs of training of today's youth for the digital economy of the future in Russia and Central Asia (Figs. 34.1 and 34.2).

According to Fig. 34.1, the attractiveness of the professions in the digital economy is very high (estimated at 10 points out of 10). The presence of general competencies necessary for young people to master the professions of the digital economy is also relatively high (8 points). The ability of young people to master professional digital competencies is moderate (6 points) due to the high complexity of this process.

The readiness of young people to withstand high competition in the digital segment of the labor market is low (3 points). The guarantees of employment, high income, and career development for the digital economy workforce in the labor market (the prospect of return on investment in training) are very low (2 points). In general, the compliance of the demand in the market of higher education services with the real needs of training of today's youth for the digital economy in Central Asia and Russia is estimated at a moderate level: $10 + 8 + 6 + 3 + 2 = 29$ points (out of 50).

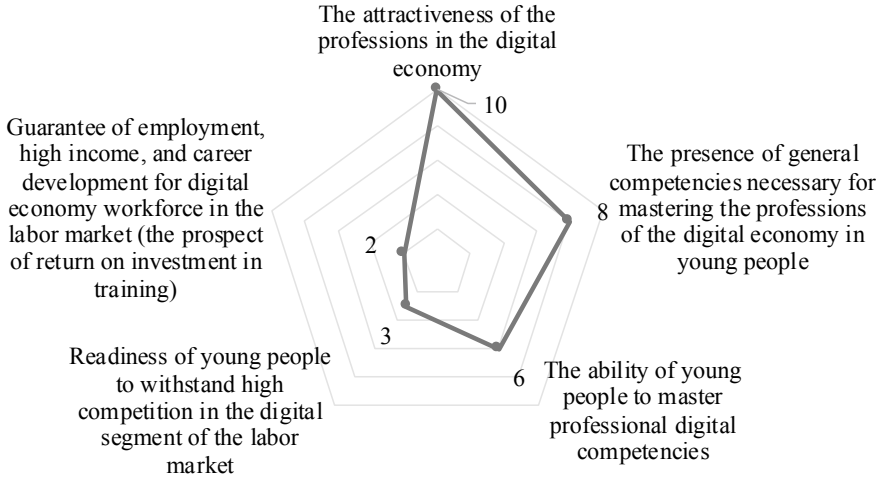

Fig. 34.1 Compliance of the demand in the higher education market to the real needs of training of today's youth for the digital economy in Central Asia and Russia, points 1–10. *Source* Estimated and compiled by the authors

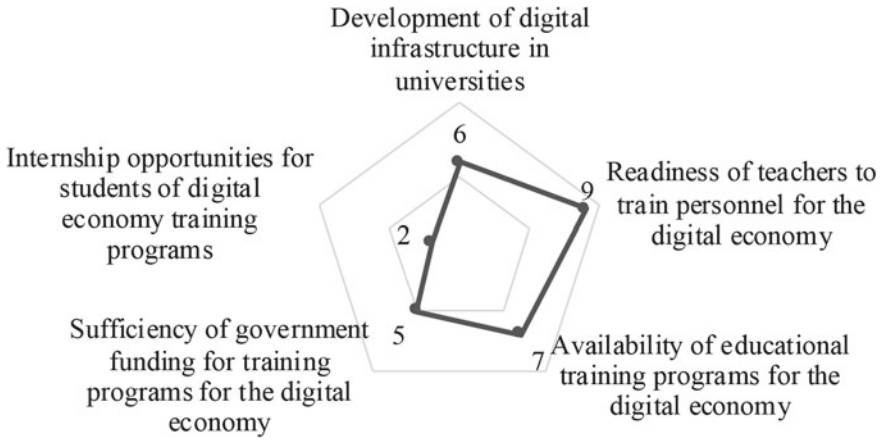

Fig. 34.2 Compliance of the supply in the higher education market to the current needs of training of young people for the digital economy in Central Asia and Russia, points 1–10. *Source* Estimated and compiled by the authors

Based on Fig. 34.2, the development of the digital infrastructure of universities is not high enough to train personnel for the digital economy (6 points). The readiness of teachers to train personnel for the digital economy is high (9 points). The availability of educational training programs for the digital economy is rated at 7 points because of the lack of refinement of national educational standards.

Government funding for training programs for the digital economy is moderate (5 points). Opportunities for internships for students of training programs for the digital economy are very low (2 points). In general, the degree to which the supply in the higher education market corresponds to the real needs of training young people for the digital economy in Central Asia and Russia is estimated at a moderate level: $6 + 9 + 7 + 5 + 2 = 29$ points (out of 50).

34.5 Conclusion

Summarizing the results of this study, the authors note that the context of training of today's youth for the digital economy of the future in Russia (and in other Central Asian countries) is moderately favorable. Thus, the labor market shows a fairly high demand for digital economy personnel, which determines the possibility of their employment in a mastered profession. Nevertheless, there is a shortage of personnel for the digital economy. The willingness of young people to master the professions related to the digital economy is moderate.

Training today's youth for the digital economy of the future requires the simultaneous implementation of both measures considered because the compliance of supply and demand in the higher education market with the real needs of training of today's youth for the digital economy in Russia and Central Asia is equal and moderate and is rated at 29 points (out of 50).

The following are recommended for social adaptation:

- Improving the ability of young people to master professional digital competencies through the development of school education;
- Targeting young people to be highly competitive in the digital segment of the labor market;
- Providing job security, high income, and career opportunities for the personnel in the digital economy (improved prospects for return on investment in training).

The following is recommended for modernizing education:

- Developing the digital infrastructure of universities to train personnel for the digital economy;
- Revision of national educational standards to improve educational training programs for the digital economy;
- Increasing government funding for training programs for the digital economy;
- Expanding internship opportunities for students of training programs for the digital economy.

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Part IV
The Current Directions of Digitalisation (EdTech) and Their Contribution to the Increase of Quality and Effectiveness of Higher Education in Central Asia and Russia

Chapter 35
Digitalization in Remote Learning

Yuri N. Lapygin, Denis Y. Lapygin, Sergey A. Boltunov, Natalia S. Andryashina, and Svetlana N. Kuznetsova

JEL Codes A20 · A22

35.1 Introduction

A typical learning process of the younger generation of qualified workers, which is similar to the in-line production of manufactured products for the market of goods and services. Nowadays academic mobility, dual education, modular training programs, networking, are replacing it, and other innovative solutions based on digital technologies.

At the same time, in modern conditions, the importance of the ability to work independently increases, which is typical not only for the self-employed (On conducting an experiment to establish a special tax regime "Tax on professional income" in the federal city of Moscow, in the Moscow and Kaluga regions, as well as in the Republic of Tatarstan (Tatarstan). xxxx) but also for persons working for several employers at

Y. N. Lapygin (✉) · D. Y. Lapygin · S. A. Boltunov
Vladimir Branch of RANEPA, Vladimir, Russia

D. Y. Lapygin
e-mail: lapygin.den@gmail.com

S. A. Boltunov
e-mail: boltunov_sa@mail.ru

N. S. Andryashina · S. N. Kuznetsova
Minin Nizhny Novgorod State Pedagogical University, Nizhny Novgorod, Russia
e-mail: natali_andr@bk.ru

S. N. Kuznetsova
e-mail: dens@52.ru

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the same time (such as designers, programmers, etc.). So-called "platform employment" enters our lives as an independent phenomenon. Freedom in choosing a place of work and registration of labor relations is transferred to the freedom to choose the educational trajectory in the process of professional training of future employees.

The development of digital technologies (Demtsura & Yakupov, 2020) brings to the educational process remote forms of learning, characterized by less interaction between a teacher and a student. In this case, a teacher loses the status of the predominant information carrier, since a student works more with electronic information resources.

In this regard, it becomes an important requirement in developing the student's competence in the independent processing of information that is publicly available on the Internet. However, while individualization of learning increases its effectiveness in terms of activity orientation in a practical perspective, different types of students' personalities perceive the process of self-learning. Therefore, the importance of mentoring (coaching, tutorial) on the part of the teacher increases.

The noted lack of online education is leveled by the inclusion in the educational process of project-based learning, which also develops the emotional intelligence of the student (Bredberry, 2011; Goulman, 2005). Moreover, according to sociologists, students learn from a friend more often and more productive than from a teacher in classes. To some extent, project learning is akin to individual learning in terms of taking on a role in practice and the development of relevant competencies. Practical activity shows that the modern professional should be able to design the development of their competencies and experience themselves in various professions, to find their place in any kind of activity.

Research of the online education market indicates a significant increase in the volume of services provided in the noted market segment (Research of the Russian online education market. — URL xxxx), which is reflected in Fig. 35.1. As for

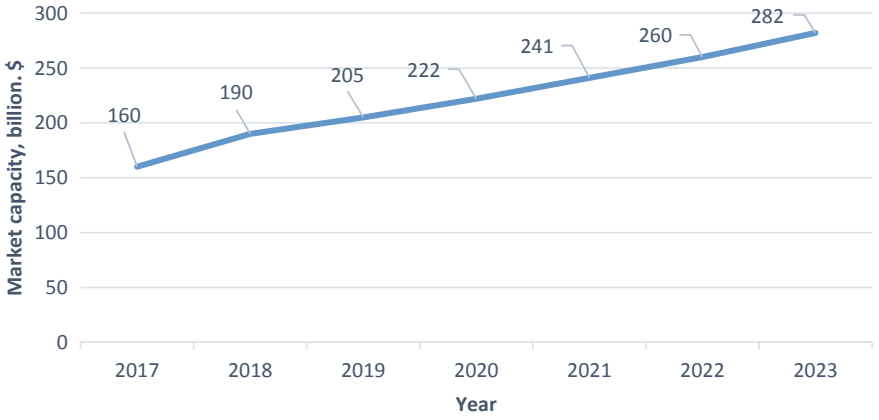

Fig. 35.1 Dynamics of online education market capacity. *Source* Developed and compiled by the authors

the prospects of the market volume for services in the field of online education in our country, growth is forecasted at the level of 53.3 billion rubles, which can be considered as additional income for the vocational education system. Although this proportion of online education structure formation in 2021 will amount to only 2.6% (Russian distance learning market: results of 2018, https://marketing.rbc.ru/articles/10886/), whereas in developed countries the same figure may reach 30% (Orusova, 2020).

The development of online learning realizes the possibility of mobility in education, in which the student chooses both the country of study, a teacher, and a training course. And if earlier in the educational chain consisted of: the author of the course—publisher—library—student, then in the online learning mode in this chain there is no publisher and library: students get access to new courses. But it is not only the content that changes, the student, as a socioeconomic phenomenon, also changes accordingly. In these circumstances, teaching must be adequately changed, realizing the principle: education through life.

35.2 Methodology

One of the main advantages of online education is end-to-end transparency when a student's success and potential can be judged on the digital trail.

Continuing education in a sense blurs the line between traditional basic vocational education and additional education becomes in demand as a person develops a need for additional competencies within the framework of the same principle of "education throughout life." In the conditions of open access to educational information resources, when it is possible to acquire competencies without training in the vocational education system, it becomes possible, within the framework of certain types of activities, to become a specialist without an offline education system.

In our country, the implementation of educational programs using e-learning and distance learning technologies is provided for by Article 16 of the Federal Law on Education (On Education in the Russian Federation http://www.consultant.ru/document/cons_doc_LAW_140174/), therefore, various forms of online learning (Abramyan & Katasonova, 2020) are becoming the norm. In the context of the 2020 pandemic, remote learning has become mainstream. However, participants in online learning have experienced both the positive and negative aspects of this form of learning.

For example, as noted by researchers (Likhacheva & Bedenko, 2020; Orusova, 2020), educational materials posted on the portals of educational institutions have become more accessible to students; reduced expenditure of resources (time, material, financial) used in the learning process; to some extent. A learning process has become more psychologically comfortable due to the direct control over the student by the educational institution; presentation (and perception) of educational material has become more systemic due to the thoughtfulness of the content.

Teachers also benefited in terms of the rational use of their resources. The convenience of presenting the material while being at home, as well as the possibility of attracting ready-made developments of the best practices posted on the portals of electronic library systems (ELS), and in Learning Material Repositories (LMS) in the form of lectures, presentations, video tutorials, books, and resources. They can be accessed from any device anywhere in the world.

35.3 Results

Digitalization opens opportunities for the development of the entire education system in terms of not only accessibility of education but also the creation of new educational structures. Thus, the government decree on the implementation of the strategic academic leadership program (About the implementation of the Strategic Academic Leadership Program "Priority, 2030" http://publication.pravo.gov.ru/Document/View/) establishes a priority in the "implementation of educational programs of higher education in a network form." With the unification of research institutes, educational institutions of the vocational education system, regional authorities and municipalities, as well as business organizations, it becomes possible to combine all the best that the members of the association have to increase the education system efficiency. In this case, the missing elements of this collaboration are created together, which enhances the synergistic effect of the network structure. Nevertheless, the question remains unanswered for now: how can such structures integrate on a national scale?

Such associations form modern content, educational services, online courses, and a system of additional education, research programs, and exchange of experience. An example of a partnership between universities is the educational consortium "Central Russian University" (Educational consortium "Central Russian University", https://www.universitys.ru/about). Such dynamically developing communities jointly develop competencies around innovations, with which they work in cooperation and competition at the same time, thereby forming a specific ecosystem.

World practice is replete with examples of the formation of university holdings with the participation of anchor companies, which are key employers. Small educational institutions also unite at the request of local business employers and government authorities.

As an alternative to intensifying competition, associations are corporate institutions, as educational institutions created at large business organizations.

However, it should be borne in mind that both associations and corporate institutions, striving to create a new digital educational product, spend many financial resources ineffectively, which is then difficult to integrate across the country.

An alternative to such efforts can be universal learning management systems (for example, the virtual learning environment MOODL (We study LMS MOODLE from 0 to PRO https://moodle.org.ru/moodle-s-0-do-pro?utm_source)), containing video tutorials, live feedback, testing, homework, webinars, and consultations. Learning

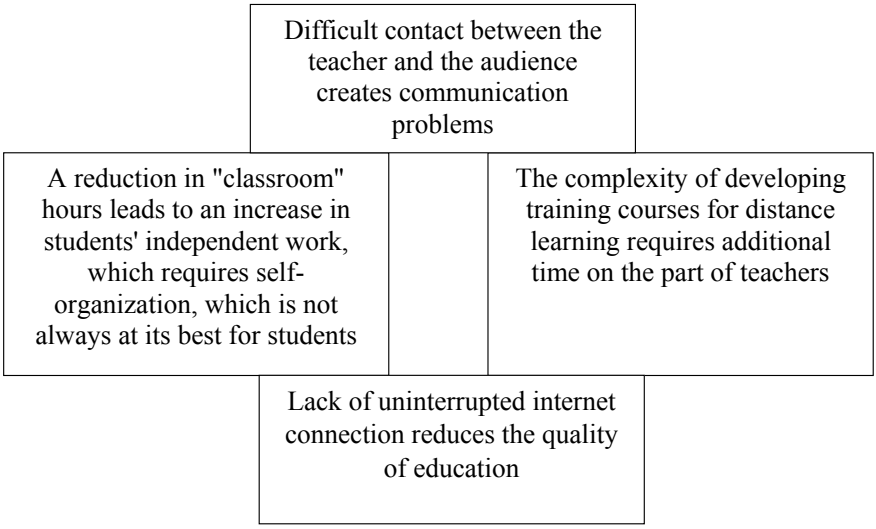

Fig. 35.2 Problems combination. *Source* Developed and compiled by the authors

management systems (e.g., LMS) provide storage for learning materials such as lectures, presentations, books, and training courses. Moreover, access to such materials can be obtained from any device at any point in the location of both a student and a teacher.

Such systems can free the teacher from classes in the case of recording lectures in digital format. However, communication between the teacher and students is lost. Students are tempted to imitate learning and many other problems arise technical and organizational difficulties in the development of distance education, difficulties for teachers in urgent development of training courses, new rules for interaction between students and teachers, insufficient self-organization of students (Lapygin & Lapygin, 2020). The combination of the most significant problems is shown in Fig. 35.2, from which it follows that both students and teachers have problems, as well as in the communication process in terms of accessibility of the Internet, and communication between students and the teacher.

35.4 Conclusion

An analysis of the links between the four formulations of these problem blocks allows us to conclude that for the successful promotion of remote learning of students, the first step is to build rules for interaction between students and teachers (or with the administration of the institution and the external environment).

We can assume that in general terms; these rules can be the basis of distance education development strategy in vocational education (Lapygin et al., 2014). This

strategy will help to remove uncertainty for teachers in terms of curriculum development processes and will focus on the self-organization of students in the learning process and also help remove technical and organizational problems constraining the development of remote education. In addition, the solution of technical and organizational issues will help teachers develop training courses and students to adjust their motivational attitudes with greater involvement in the process of remote learning.

In conclusion, it should be noted that the educational process in remote form is significantly different from traditional classes, which requires significant changes in both activities teachers and students. The global teachers' community and educational institutions, as well as domestic leaders of online education, have prepared significant information resources that can be used by adapting them to specifics of disciplines of various educational programs: videos, slides, tests, cases, methodological recommendations, and similar resources. Moreover, since the transition to distance learning will continue for a long time, educational institutions need to develop a strategy for their development in the new reality of digital education.

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Chapter 36
Expanding the Competencies of the Tax Specialist of the Future in the Context of Digital Educational Realities

Nelly N. Galeeva, Evgeny A. Shamonin, Yuliya R. Rudneva, Olga G. Kantor, and Anastasia M. Rogacheva

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36.1 Introduction

The activity of tax authorities in the area of digital technologies of tax administration and control has been gaining momentum recently. This is achieved through the further digitalization of tax administration and the integration of all sources of information and data streams into a single information system, followed by the analysis of this data based on modern technologies for processing large amounts of information.

The emergence of the Big Data thesis radically changed the view of the tax service on the data generated in their information systems, which began to be viewed as an independent asset.

Speaking about the analytical Big Data tools, which are used in the tax service, it can be cited as an example that an automated system for monitoring the calculation

N. N. Galeeva (✉) · E. A. Shamonin · Y. R. Rudneva · O. G. Kantor · A. M. Rogacheva
Ufa State Petroleum Technological University, Ufa, Russia
e-mail: nelli-galeeva@yandex.ru

E. A. Shamonin
e-mail: shamonin@bk.ru

Y. R. Rudneva
e-mail: julrud1976@yandex.ru

O. G. Kantor
e-mail: o_kantor@mail.ru

A. M. Rogacheva
e-mail: izabo@bk.ru

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and payment of value-added tax, reforming the current procedure for using cash registers based on the online transmission of data on settlements to the tax authorities.

Along with new digital opportunities and analytical tools for tax administration, it's necessary to ensure the demand for specialists in the tax area in the future. This can be achieved through the constant acquisition of new skills that meet modern requirements. These include skills in the application of information technology and data analysis in the tax area, as well as interpersonal communication skills.

36.2 Methodology

Knowledge of tax legislation, the ability to draw up tax calculations, declarations will continue to be relevant in the future for tax specialists. But in the conditions of a dynamically changing business and tax environment, it hasn't already been possible to do without information technology in the work of tax specialists, where it's constantly necessary to process a large amount of data. The development of digital technologies in taxation requires a new and innovative mindset.

According to the Price water house Coopers report (PWC Tax Professional of the Future: staying relevant in changing times, 2017), the successful tax professional of the future will be an expert in data analysis, statistics, and technology, as well as in process improvement and change management. At the same time, tax specialists will be required to ensure their relevance by constantly developing professional skills, including digital ones.

The difficulty in describing labor functions that will be in demand in the near and medium-term is one of the challenges for specialists in the area of higher education studies. The implementation of educational programs in conditions of a high degree of uncertainty in the content of promising professional skills reduces the value of such competencies and, accordingly, the motivation of students to develop them (Bakhtizin et al., 2019).

In 2013, the Association to Advance Collegiate School of Business (AACSB) approved the International Accounting Accreditation Standard A7 "Understanding of information technologies and their application skills for students studying in accounting specialties" which was included in the AACSB accredited curriculum. Only the best universities in the world deserve AACSB accreditation, which indicates the entry of universities into the pool of world grandees of business education. In Russia, only the Institute of Business and Business Administration of the RANEPA has such accreditation.

Taking into account this standard, the training of specialists in the tax area should instill skills and knowledge related to the integration of information technology into accounting, tax accounting, and business. Training should include the development of skills and knowledge related to data creation, data sharing, data analytics, data mining, reporting, and data storage within and between organizations.

Another skill that the tax professional of the future should have is interpersonal skills and developed emotional intelligence because the use of information technology requires a new way of thinking.

The digital realities of modern society predetermine the need to revise the qualification requirements of tax specialists by highlighting the knowledge, skills, and abilities, which are necessary for their activities in the digital environment (Vasilieva et al., 2018), as well as improving the educational environment, mediating their formation and subsequent development within the framework of a continuous education system based on multidisciplinary and adaptability of educational technologies (Vanchukhina et al., 2019).

Organizational, technological, economic, and legal aspects of the digital transformation of the educational environment are the subject of many studies (Burning Glass, 2018; Janelli, 2018; Kondrashova, 2017; Kullaslahti et al., 2019; Mezentseva et al., 2020). At the same time, doctrine and educational practice faced the need to speed up the transformation process and its methodological support in the conditions of COVID-19.

36.3 Results

The education system was forced to quickly change in connection with the pandemic, and all that was considered yesterday as additional opportunities have become practically the only way out of the situation today. This is about distance educational technologies. They, of course, were created and developed earlier, but it's unacceptable to use technologies whose purpose is to complement and/or be an alternative as the organizational and technical basis of the education system without their conceptual revision.

The description of the functional capabilities of existing distance learning technologies is based on the experience of using distance learning technologies in the framework of the training of masters and bachelors of economics at the Ufa State Petroleum Technological University (USPTU).

The study of the problems of using distance educational technologies, in the author's opinion, can be divided into several stages:

1. Communication services allowing the implementation of distance learning technologies. At this stage, it's necessary to study the advantages and disadvantages of various platforms for conducting joint educational online classes (mastering theory, practical exercises, and laboratory work) from the point of view of the characteristics of economic education.
2. Supplementary cloud applications and services such as file storage, social services, email clients, remote control systems, and others. These tools can be used to host, store, and organize online and offline teacher and student access. The issues of security, the safety of the posted data, the possibility of updating, and group work are subject to study and analysis.

3. Professional cloud systems: accounting, calculation and analytical, regulatory, reference, management, financial, project management, office (general purpose). It's necessary to analyze which systems (firms) have such services, what are the conditions for their use (software, hardware, organizational, financial), are there any systems that have already adapted to the educational process among them, what are their advantages, and disadvantages? If there are no special training sites, how the real business versions can be used? A separate question at this stage is how to build the educational process, taking into account their use, due to the technology of working with cloud services implies the presence of certain conditions, restrictions, assumptions that were not included in the curriculum, and calendar plans developed for the usual educational process?
4. The system for assessing the competencies mastered by students. If there are any assessment systems described in clause 3, it's necessary to describe them and analyze them for completeness and adequacy to the objectives of the discipline, and if there are no assessment systems, methods, and technologies for assessing (both competencies in general and individual indicators of students' work—time, quality, quantity, completeness, etc.) have to be developed. The possibility of embedding own assessment systems into professional cloud services isn't only a methodological problem, but also a technical one, therefore, the solution to this issue, in the author's opinion, lies in the plane of interaction between the educational institution and the developers of the professional service.
5. Determination of the competence levels of teachers in the framework of the use of the entire set of distance learning technologies. Not only professional skills in working with cloud services should be described, but also administrative skills, skills of operational management of services. This problem is the least studied and requires careful study today, up to the introduction of attestation and certification systems. This is not to say that this doesn't exist at all, examples of attestation and certification of teachers in various courses and programs exist, but do they all take into account the specifics of distance education? First of all, it should be said that the educational process, in the author's opinion, can't be complete without communication between the student and the teacher. At the same time, in the conditions of distance education, it's necessary to use communication platforms where text and audiovisual communication means can be used.

The compelled and instantaneous transition and the distance learning process "forced" teachers and students to "study" such technologies, and this is certainly very good because, in the transition to the usual face-to-face communication in the educational process, distance elements with online communication will be used in addition to traditional. The most popular and functional among a large number of existing communication platforms are such as Yaklass (Якласс), Skype, Zoom, bigbluebutton, and others.

The above examples have different functionality and target application, but they are united by a conceptual purpose—a means of communication. Additional functions include such as the ability to show the screen of a certain participant (one or

more), the ability to share files, the presence of a visual virtual whiteboard, and others. Each teacher defines for himself a set of functions that are necessary and convenient for conducting classes in a specific discipline. On the example of studying such disciplines as "information technology in professional activity", "professional computer programs" with economists and managers, such a disadvantage as the inability to intercept the control of a participant's computer can be singled out, similar capabilities exist in a separate class of remote control programs, for example, TeamViewer, AnyDesk.

The use of such systems requires the provision of increased security means and compliance with certain information and ethical standards allow for a better and more efficient solution of issues that arise during classes.

The using general-purpose cloud services (file storages, public polls, and shared tables) can't remain forgotten. Their use in the educational process allows creating common places for storing files, control access to these resources; among the minuses, only certain requirements for access, file formats, and the total size allocated for storage can be noted, however, this is a conditional minus, due to this issue is being resolved either paying for additional storage or creating multiple accounts to host and store files. As an example, such cloud files storages like Dropbox, Google Drive, iCloud, Yandex.Disk, Mail.Ru Cloud, and others can be named.

It's also worth mentioning the presence of cloud services for group work with text and tabular data. They allow processing (read, edit, download) data located in the cloud storage by specified users (user groups) in real-time. Among the most popular are services such as Microsoft 365, Google Sheets, Google Docs, Google Slides, etc.

The use of 1C cloud services in the educational process, in the opinion of specialists in the area of accounting, analysis, audit, finance, looks well-built today. A cloud platform designed for training economists and managers can create user groups (an analogy with study groups and streams can be drawn), it's also possible to build an individual educational trajectory (by creating several applications for one user (student) and not only within a certain platform with different releases and occupancy but also completely different analogs of business platforms, accounting or management), there is a built-in control system tool (the teacher (administrator) can see the author, time, actions of the subscriber (student). However, for all its functionality (including practically unlimited in comparison with business versions), from the point of view of educational tools, certain disadvantages can be noted. Firstly, the registration of subscribers doesn't provide for the possibility of loading a list from a file (and this is although the 1C system (educational and business versions) "is able" to convert text and tabular formats). The second disadvantage is the limited search capabilities for subscribers, who have already registered (if, for example, a previously registered user needs to be given access to another InfoBase); the impossibility of replacing the subscriber's postal address (because it's the login) should be attributed to the same problem.

Administration by subscribers is also insufficiently functional (the administrator can't help the subscriber (student) to change his username and/or password, and also doesn't see the reasons for refusing auto integration. The administrator (teacher) doesn't have the possibility of personal communication on the portal during the

lesson (there is no general, no personal chat, and also no even text chat), i.e., the distance educational process is possible offline, (issued a task—then checked the fact of its completion), or with the use of additional distance technologies (for example, Zoom, bluebutton, etc.).

The lack of a system for assessing the level of development is the most significant problem. The declared possibilities for assessing the work of users are purely formal since neither the time of work nor the actions on the objects allow assessing the level of mastering the skills of using the tools of accounting and analytical work.

USPTU deployed a distance education system for correspondence courses on the Moodle platform many years ago. This is a fairly powerful platform that provides for a large number of interaction formats between a teacher and a student (listener), including online communication. This is an example of a universal means of providing a distance educational process, in which there can be created means of audio, video communication, storage of files, and a system for assessing the development of competencies. However, its use requires special training on the part of teachers and a staff of specialists, for its maintenance and integration with various external and internal resources.

All that was described above can be classified according to certain aspects. The classification given in Table 36.1 doesn't pretend to be complete and sufficient—this is just the beginning of research in the area of tools and means of providing distance learning processes.

Thus, the described aspects allow drawing certain conclusions:

- There is no significant scientific research in the area of technologies and tools for providing distance educational processes today;
- Neither teachers nor students of higher education have a conceptual understanding and balanced understanding of the advantages and prospects of distance education;
- Existing educational standards don't provide for the widespread use of distance learning technologies;
- In the educational environment, a rethinking of the communication and technical capabilities of information technologies is taking place, which in the future should give an impetus to the emergence of completely new educational programs and courses, where information technologies will be used not as a substitute for paper and full-time work, but as a new tool for mastering professional knowledge and skills and abilities.

36.4 Conclusion

Implementation of the tasks of tax corporate planning and tax administration is impossible without information production (Vanchukhina et al., 2018). For the student to become a successful professional in the area of taxation in the future, he must be trained in technologies, methods of analysis and data processing, and practical examples. With the help of it, the student will be able to easily cope with business tasks and tax issues in their professional activities in the future.

Table 36.1 Classification of distance education tools

Type	Objective function	What may be missing	Service examples
Communication platforms	Audio, video, and text online communication	Simultaneous broadcasting of multiple screens, remote control, time and subscriber restrictions (free versions), lesson recording, the presence of an interactive whiteboard	Zoom, bigbluebutton
Cloud storage	File storage and access control	Volume (additional volume—for a fee), access levels (editing, downloading, creating)	Dropbox, google drive, iCloud, Yandex.Disk, облако mail.ru
Batch processing services	Group editing of documents (text, tables, presentations)	Rights management, account availability	Microsoft 365, google tables
Controls (polls, tests, remote control)	Testing knowledge and skills	Connection security during remote control, ethical issues when gaining access to control	TeamViewer, AnyDesk
Professional distance education systems	Information support for the study of the discipline	The complexity of creating courses, oversaturation of settings and functions, the need for specialized service	Moodle, swad
Professional cloud services	Performing professional tasks for information processing	Means of communication, lack of controls	Edu.1cfres.com

Source compiled by the authors

To implement this idea, universities must have close relationships with employers for training to be closer to real-life conditions.

Let's consider the features of creating an educational environment proposed by the authors that contribute to increasing the competitiveness of graduates-economists in the labor market through the formation and development of demanded competencies.

To ensure the development of tax knowledge and increase the professional competencies of students, it seems necessary:

(1) The formation based on a higher educational institution using information technologies (including distance) a discussion platform in the format of master classes and round tables, which allows involving students and professionals in

the exchange of views on taxation issues and targeted dissemination of best practices;
(2) Expanding interaction with potential employers;
(3) Creation of conditions for early professional development and the formation of stable motivation of students for professional activity.

The introduction in universities of master classes, round tables, panel discussions, business games for the target audience with the involvement of leading practitioners in the tax area will allow students to be involved in the realities of professional activities. Universities need to constantly interact with representatives of the profession to understand the needs of the tax function and on time to adapt to the changing requirements of potential employers.

An effective way to familiarize students with the tax function is to provide students with consulting services to the population on taxation issues, provide practical advice on how to fill out tax returns with the support and participation of tax officials, including using information technology, to integrate the acquired technical skills and use skills into teaching information technology. Technologies, of course, made it possible to achieve efficiency, but they must be applied only in conjunction with certain knowledge and skills.

The creation of a center for consulting services for information and educational work with citizens with the involvement of tax officials to increase tax literacy of all groups of the population also contributes to strengthening the image of the Federal Tax Service of Russia as an open, client-oriented authority, and with the subsequent transition to the Internet environment—to create a comfortable environment for citizens to fulfill their tax obligations.

The target audience is various groups of the population who are active users of the Internet space.

Types of services:

- Consulting services to promote the optimal and proper performance by citizens of their tax obligations;
- Services for the preparation of tax reporting;
- Development of special projects to optimize tax payments to individuals;
- Activation of interaction between the population and tax services through the use of the functional capabilities of electronic services of the Federal Tax Service of Russia.

Expanded interaction with potential employers will allow the student "firsthand" getting acquainted with all areas of work of the tax function, its role in business development, and also numerous opportunities for professional implementation within this function. The student will be able to adapt to work with specialized applications for processing tax information for taxpayers, and he will have an idea of information technology in the activities of tax authorities (OLAP technology, Data Mining technology, information storage technology). He can also develop relationship-building skills through listening and the ability to explain tax issues to non-tax professionals. This interaction will have a positive effect on employers in order to form approaches

to motivation and retention of personnel. They must adapt to the ever-changing demands of professionals of different ages. For example, "millennials" want to see the results of their work immediately. If he stops feeling satisfaction from the functions performed, he will look for another job. And, for example, Generation Z will not imagine life without the latest technologies and numerous social networks. Consequently, employers shouldn't lose touch with universities, otherwise, they will not be able to adapt to the new aspirations of tax specialists in order to retain staff.

The tax function of the future must grasp the potential of technology. With the help of technology and data analysis, the tax professional can quickly process large amounts of data, which frees him from the need to solve tasks that were previously performed by people and use the freed up time for planning and assessing his financial and tax indicators. Over time, it will be difficult to find a specialist with skills that can't be replaced by the use of technology and machinery. Increasingly, employers are saying that it was becoming more difficult to find a tax specialist with creative, communication skills. The tax professionals of the future will need to develop their listening skills and the ability to explain tax matters to non-tax professionals in a way to be heard and understood.

The task of educational institutions should be to develop students not only theoretical, technical skills, skills of working with big data and technologies on tax issues, but also to form tax specialists who can understand the tasks of the organization as a whole, to build relationships with external and internal participants.

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Chapter 37
The Role and Importance of Interactive Technologies for Methodological Support of Teachers in the Integration Mechanisms of the Modern Economy Development

Natalya V. Belinova, Natalya V. Vyalova, Tatyana G. Khanova, Larisa V. Krasilnikova, and Anna Yu. Vershinina

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37.1 Introduction

Based on the regulations of the federal state educational standard of preschool education, the professional pedagogical community is focused on acquiring optimal professional competencies by teachers of preschool educational organizations, sufficient for the transition of preschool educational institutions from the stage of functioning to a new stage of transformation and development of the educational process (Bicheva & Kaznacheeva, 2020).

The principles of strategic planning for the development of education in the Russian Federation, based on the legislative framework, predetermine the goal of professional mastering of preschool teachers' competencies, since the effectiveness of the introduction of innovative methods and modern educational technologies, the effectiveness of educational programs relevant to the social structure in pedagogical activity directly depends on the professional competence of specialists of preschool educational organizations (Ponachugin, 2020).

N. V. Belinova (✉) · N. V. Vyalova · T. G. Khanova · L. V. Krasilnikova · A. Yu. Vershinina
Minin Nizhny Novgorod State Pedagogical University, Nizhny Novgorod, Russia

N. V. Vyalova
e-mail: nataliya_vyalova@bk.ru

A. Yu. Vershinina
e-mail: starikova.anneta@mail.ru

E. G. Popkova and B. S. Sergi (eds.), *Digital Education in Russia and Central Asia*,
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The prior task of a modern educational organization should be considered the development and support of teachers' readiness to reform the existing educational and developmental space; transformation of methods and forms of professional influence; application in practice of technologies of advanced scientific experience (Belinova et al., 2020a).

The foregoing fixes the special importance of methodological work in the design and maintenance of the processes of development and improvement of the professional competencies of teaching staff.

Methodological support in a preschool educational organization is aimed at increasing the competence and comprehensive development of the professional skills of teachers of the educational micro-society, and as a consequence, the quality of the educational process as a whole (Bulaeva et al., 2020).

In our opinion, the methodological work is a complex of interrelated activities based on modern scientific achievements and progressive experience of educators-innovators (Khanova & Belinova, 2020a).

The concept of "methodical work" is defined as a type of educational process management system with specific goals, objectives, methods, forms, and functions, focused on ensuring the quality of preschool education in general and the effectiveness of processes in the educational context of a kindergarten (Khanova & Lifanova, 2020).

Thus, the main goal of the methodological service of the kindergarten is to design and support the system of personal and professional growth of teachers, which in turn provides indicators of the quality of education in accordance with the requirements of the federal state standard for preschool education and the sample basic educational program. It is noted that in order to achieve this goal, first of all, it is necessary to identify the level of professional training of pedagogical personnel, their needs, and possible difficulties, taking into account the specifics of the preschool educational organization, then proceed to formulate the goals and objectives of methodological work (Smirnova et al., 2020).

Clarifying and specifying the tasks of the methodological service of the kindergarten for the design and maintenance of the system of personal and professional growth of teachers, the researchers systematize them in a clear sequence:

- to develop normative rules for the educational influences of the subjects of the educational space;
- establish and choose the methods, means, and forms of interaction between the subjects of the educational process, according to the developed educational space;
- to provide teaching staff with the possibility of continuous development of theoretical and methodological concepts;
- make conditions for the development of professional competence and the exchange of innovative teaching experience (Khanova & Belinova, 2020b).

We point out that methodological work and professional competence of teaching staff in a preschool educational organization are interrelated. Scientifically based methodological work contributes to:

– carrying out the highest quality diagnostics of the pedagogical activity of each educator;
– pointing relevant pedagogical problems;
– designing and adjusting individual routes for the development of professional competence of the teaching staff;
– timely satisfaction of the educational needs of the teacher, in accordance with the existing individual development cards of teachers (Yashkova et al., 2020).

A number of scientific practice-oriented studies on the design of a model and algorithms for methodological support in specific kindergartens revealed a number of problems and contradictions that significantly impact both the quality indicators of preschool education in general and the support of the personal and professional growth of teachers in professional activity, in particular. Among these problems, the most obvious is the lack of managerial competence of the head of the kindergarten, the lack of timely organizational decisions, setting goals relevant to the system and planning of methodological activities, conducting a comprehensive assessment of the preschool education system in a particular kindergarten, analyzing the real situation, and researching professional opportunities and needs of the teaching staff, dialogue with a professional team (Bicheva et al., 2018).

Based on the stated above, we came to the conclusion that in the introduction of methodological support for the development of professional competence of teachers, it is necessary to comply with a number of requirements:

– when developing the content, proceed from the specifics of the preschool organization, the needs, and difficulties of teachers (Potanina & Khanova, 2017);
– ensure an individually differentiated approach to each teacher;
– to promote the dynamic development of new knowledge and the acquisition of professional skills in a particular area (Suneeva & Khanova, 2018);
– monitor the effectiveness of the work being done to develop the professional competence of teachers and promptly introduce adjustments (Khanova & Potanina, 2017).

In the context of the implementation of the federal state educational standard of preschool education, the status of the teacher, one's key functions change significantly, and the requirements for professional competencies are updated accordingly. Modern sociocultural challenges lie in the fact that creative teachers are in demand, capable of developing their personal potential, able to apply all the knowledge gained in practice, longing for continuous education, and improving one's skills, as a determining factor in improving the quality of education. We are convinced that improving the quality component of the professional skill of teachers directly depends on the effectiveness of managing the career development of teaching staff of an educational organization (Belinova et al., 2020b).

In connection with the growing requirements for the professional competence of teachers, the strategy of methodological work is changing, the nature and focus of which is determined by the professional maturity of each employee. As a result, interactive forms of methodological work with teachers are being updated.

Interactive forms, in our opinion, are carried out in conditions of constant, active interaction of all participants, their maximum involvement in the dialogue. The introduction of interactive forms contributes to the achievement of one of the important goals of working with a team: increasing the level of activity and independence, developing creativity of thinking, a desire for cooperation, stimulating interest and motivation for self-education, developing the skills of analyzing and reflecting on one's activities. The use of interactive forms of methodological support ensures an increase in motivation for professional activity and social activity, support for the experience of joint activities, the ability to make team decisions, mutual respect, cooperation, and ultimately, improve the quality of educational activities.

37.2 Methodology

The purpose of our experimental work is to study the role and importance of interactive technologies in the implementation of methodological support for teachers as a way to improve the quality of education.

A practical study was organized, in which 30 teachers of preschool educational organizations took part. For comparison and contrast of the results of the study, the participants were divided into experimental and control groups.

Based on the parameters of the key competencies of teachers, the authors determined the competency criteria, indicators and levels of their formation, which allowed to determine the diagnostic tools: (1) questionnaire survey of teachers (the analysis of the survey data was carried out according to the methodology of V.A. Slastenin "Study of the formation of professional competence of teachers"; (2) analysis of the environment in kindergarten groups; (3) observation of the activities of teachers in the process of carrying out the educational process with preschool children.

37.3 Results

Taking into account the data accumulated in modern theoretical and methodological research and recognizing the importance of methodological support for the development of professional competence of teachers, we organized and conducted an empirical research.

At the diagnostic stage of the study, the assessment of the level of the professional competence of teachers was carried out on the basis of certain measure tools. The analysis of the results of pedagogical diagnostics of the level of competence of teachers allows to state that there is an insufficient level of the professional competence of the teaching staff; the interaction of the methodologist with the teaching staff is carried out episodically, situationally, and is not based on a systematic approach to monitoring the quality of educational results. The lack and irregularity of methodological support do not allow to designate in the pedagogical environment the high

importance of professional competence and the need for its continuous improvement and self-education, which indicates the necessity to develop and test a special system of methodological work based on the development and implementation of interactive technologies for communicating with the teaching staff.

The purpose of the second formative stage of the experiment was the development and testing of a series of interactive methodological measures for the design and maintenance of the system of personal and professional growth of teachers, as well as monitoring the quality of education against the background of the work being done.

Methodological support of work on the development of professional competence of teachers was carried out through a number of pedagogical conditions:

– systematic implementation of methodological measures to improve the pedagogical competence of teachers;
– organization of active practical activities of teachers in the professional field;
– predominance of interactive forms and methods of collaboration (Table 37.1).

During the realization of the formative stage of work with the pedagogical community, we found that the most productive forms of improving the professional competence of teachers were a round table, a master class, a business game, etc., in which teachers were given the opportunity not only to demonstrate their pedagogical knowledge and skills, but to show creativity, non-standard ways of solving professional problems. Thus, it was noticed that the format of the round table contributes to building interactive communication between teachers. They sit in front of each other and can appeal to all other participants of the round table as direct partners in the dialogue, taking full advantage of the possibilities of effective interaction and perception. In direct communication, teachers often appeal to their professional and sensory-emotional experience from working with children and, thus, an integral dynamic context for the implementation of preschool education is formed in this particular professional group.

To create constructive practices for transforming the existing situation, the most effective format is a business game. A business game can be organized as a cycle of professional algorithms, through which teachers jointly conceptualize and analyze practical cases, and also come out with a package of working solutions to change the problem situation with the most optimal effect for all participants in the educational process, including the parents of the pupils.

Another form that has confirmed its validity in the practice of training professionals in preschool education is a master class. A master class is a demonstration and teaching of any kind of labor action by a master, the transfer of unique practices and techniques for organizing work with children. Master classes are equally welcomed and in demand both by novice teachers who are looking for interesting techniques to define their own pedagogical pattern, and by professional teachers who do not want to stop there, but long for constant self-improvement.

"Brainstorming" is suitable for conducting pedagogical competitions, reviews, methodological associations, etc. All participants in the discussion offer various

Table 37.1 Content of methodological work on the development of professional competence

№	Methodical work form	Topic	Objectives of methodological service
1	Round table	Interactive forms of work with parents	Improving the professional competence of teachers on the issue of interaction with the parents of pupils
2	Coaching	Safety culture development for children	Development of teachers' professional competence in the development of a culture of safe behavior for children
3	Intellectual game	The most creative	Development of verbal creativity, originality, fluency, and flexibility of thinking
4	Brain-rating	Optional education in the kindergarten	To update the knowledge of teachers about the modern principles of organizing optional education, the development of creativity, the generation of new ideas
5	Brain-storm	Safety of the educational environment	Development of the creative potential of teachers on the organization of the environment
6	Quest	Kindergarten of the future	Development of the creative potential of teachers, pedagogical competence, activation of thinking and search activity
7	Master-classes	Child–parent projects	To increase the pedagogical competence of teachers in interaction with parents; develop search and creativity, understanding the importance of involving parents in the educational process
8	Case	Technologies of spiritual and moral education of children	Development of the skill of teachers to defend their position reasonably; develop various options for solving problem situations; building the skill to conduct constructive dialogue
9	Review-competition	Best site	Demonstration by teachers of an organized environment
10	Simulation business game	What are you?	Development of the skill of modeling specific events that happened in reality, and making an adequate decision to go out of them

(continued)

Table 37.1 (continued)

№	Methodical work form	Topic	Objectives of methodological service
14	Pedagogical discussion	Culture of communication with children	Generalization of the knowledge of teachers on the problem of personality-oriented communication with children, assessment of the effectiveness of methodological work

Source Developed and compiled by the authors

solutions, then the most successful ones are selected that can be used to solve the problem, ideas are assessed on the originality and opportunities for implementation.

As in classic brainstorming, brainwriting participants are introduced to a problem, for which the group needs to put forward as many ideas as possible. But, unlike the classical event, the generation of ideas occurs in complete silence and is carried out according to the scheme: each member of the group is given a form in which one needs to write down three ideas, then the forms of the participants are passed in a circle and the task of the participants who received the form is to modify the ideas, supplement, improve. This method is good in that in a short period of time, a group of participants receives a larger number of ideas than in a conventional brainstorming session.

Quest is a game that requires participants to solve riddles, solve mind problems in order to achieve the final goal. As a rule, the quest is endowed with a certain plot, the course of which can be predetermined, or it can change depending on the actions of the players.

It should be noted that initially, the teachers did not develop the skills of effective cooperation with each other. Discussing this or that problem, the teachers argued with each other, did not take into account the position of opponents, moreover, they experienced some psychological tension, unwillingness to interact. Special psychological techniques helped us to solve this problem. Thus, relaxation, music therapy helped to reduce the psychological stress of the participants. Games, dance activities, joint creativity brought teachers closer together. The attitude toward cooperation, acceptance of a different opinion before each event contributed to the fact that teachers became more careful in communicating with colleagues, tried to listen to each other's opinions.

To identify the effectiveness of the study, we repeated diagnostic techniques with the teachers. The results of the experimental work showed that as a result of systematic methodological support, the level of formation of professional competencies and professional consciousness in general increases; teachers deepen their theoretical knowledge, improve their practical skills, develop their own interest in self-education, and increase professionalism.

Thus, on the basis of the analytical data obtained, we can assert that in the course of the experimental work carried out, the effectiveness of interactive technologies in improving the quality of methodological work to improve the professional competence of teachers was proved.

37.4 Conclusion

Having analyzed the scientific research carried out, we came to the conclusion that solving the problem of developing the professional competence of teachers requires all subjects of the educational environment to fully immerse themselves in the educational process to create a favorable educational environment and improve the quality of education. The coordinated subject-to-subject interaction of all participants in the educational environment on the basis of organized methodological support contributes to the development of the professional competence of teachers, the creation of a favorable educational environment, and an improvement in the quality of education.

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Chapter 38
Digital Education as a Condition for Maintaining a High Level of Socioeconomic and Managerial Effectiveness and Competitiveness of Higher Education Systems

Alexander P. Gorbunov, Natalya N. Gorbunova, Miroslava A. Gorbunova, and Galina N. May-Boroda

JEL Code I21

38.1 Introduction

The development of the concept of digitalization of education is undoubtedly necessary for science to maintain the high efficiency and competitiveness of higher education systems.

Nevertheless, digital education cannot be considered an innovation revolutionizing orthodox education. The precursor of digital education is media education, which was actively developing throughout the second half of the twentieth century. In this regard, it is legitimate to argue that digital education represents the next stage in the development of media education in the system of post-industrial society. There is also a position opposing digital education to general education. Proponents of this position assign digital education to special training for professional purposes. Even though Russian theorists have not yet clearly formulated the content of digital

A. P. Gorbunov · N. N. Gorbunova · M. A. Gorbunova · G. N. May-Boroda (✉)
Pyatigorsk State University, Pyatigorsk, Russia

A. P. Gorbunov
e-mail: gorbunov@pgu.ru

N. N. Gorbunova
e-mail: gorbunova@pgu.ru

M. A. Gorbunova
e-mail: gorbunova@pgu.ru

E. G. Popkova and B. S. Sergi (eds.), *Digital Education in Russia and Central Asia*,
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education, there are opinions viewing digital education in terms of an all-consuming system requiring a rethinking of traditional features of the educational process.

It is necessary to give a reasoned confirmation of the status of digital education. European science, which started to study and develop digital education much earlier than Russian science, considers this a concept as digital learning with the help of digital devices (Golovanova, 2019).

Thus, there is no unified interpretation for digital education, and its definitions bear the imprint of professional orientation (pedagogical, economic, IT-sphere, managerial, etc.).

38.2 Materials and Method

A system analysis, including the required methods and scientific techniques to evaluate the research results, constitutes the methodological basis of this research.

System analysis is demanded as a set of methodological tools used to develop and justify scientific decisions on complex issues. It has the following peculiarities:

- Provides for the beginning of implementing decisions with the identification and clear construction of final purposes;
- Proceeds from the need to study the issue integrally as a complete system and to establish all results and interdependencies of the separate decision;
- Involves the discovery and assessment of possible ways to achieve the goal.

38.3 Results

The primary patterns determining the distinctive features of digital education include several trends of the progressive movement in professional education, providing improved socioeconomic and managerial efficiency and competitiveness of higher education systems in the modern digital society. These trends are as follows:

- Large flows of information are accessible to everyone without much resource consumption. Nowadays, there are all sorts of educational portals, library information systems, online museums, platforms for curriculum development, and videos by acclaimed scholars. It is possible to get an education in a distance format on a topic of interest (Malakhova & Bokova, 2019). Thus, there are unique conditions for improving the efficiency and accessibility of educational systems for the benefit of different age categories of the population and without territorial constraints, provided by the Internet access;
- The levels of scientific and technological development and the volume of information resources require continuous professional development. The “lifelong learning” experience of the twentieth century led to an assertion that lifelong learning

is mandatory in the third millennium. That said, the absolute value of digital resources is vital for all areas of activity (Nikulina & Starichenko, 2018);

- Worldwide information system, large volumes of data, and their display in various formats lead to a myriad of ways to obtain information and create a personal digital education plan. In these conditions, the learner has to solve several educationally significant problems at his own discretion. The first problem is the recognition and formulation of personal educational requests, which involves the formation of a special educational trajectory;
- Formation of new standards for the content of the educational process in terms of its practical orientation, reduction of the role of the traditional component of the educational content while increasing the availability of knowledgeable and educationally valuable information and increasing the influence of the activity aspect of education (Bilenko et al., 2019). Thus, there is an increase in the level of structuring activities in education during the digital transformation of the educational process. The variety of forms of organization of educational work in the conditions of digitalization of education increases significantly and acquire an active character, which qualitatively improves the efficiency of the educational process.

The above trends and priorities for improving the system of higher education should be taken as the basis of an educational paradigm, where education is a competitive and effective sphere contributing to the satisfaction of cognitive interests, the need for communicating with the humanitarian reference points in the search for realistic ideals, a reflection of oneself and someone else. Thus, it is necessary to create conditions for implementing an approach that provides opportunities to revive subjective meaning in higher education systems, indicates the ideas of expediency of human self-expression and self-actualization, and integrates the benefits of humanistic values through the recreation of axiological goals.

Digitalization is developing at an incredible pace in all spheres of social life. The development of digital technology is associated with revolutionary breakthroughs in material production, the modernization of the political system, and the organization of opportunities for quality education and the personal growth of the population. The Government of the Russian Federation declares the goal for the construction of digital society for the near future (until 2025). It is planned to digitalize all industries, transport, services, etc. It is impossible to achieve these goals without the formation of a system of digital education.

Increasing the level of digitalization is expected as part of the national program "Digital Economy" (more specifically, the federal-level project "Human Resources for the Digital Economy"), the national project "Education" (more specifically, the federal-level project "Digital Educational Environment"). It is still necessary to set detailed goals and objectives that define the essence of the digital transformation, namely:

- Reducing the number of ignorant and unsuccessful students;
- Ensuring conditions for full disclosure of talents and increasing the level of competitiveness of education;

- Noticeable reduction in routine work for all subjects of educational relations;
- Improving the skills of living in a digital learning environment.

The Concept of the Basic Competency Model (BCM) of the digital economy has been developed to help ensure the implementation of federal projects. It is a normative document reflecting the system of unified requirements for developing and promoting competencies of the digital society throughout the person's life. Applying the concept of basic competencies in a digital society requires not their replication but a proper interpretation of the content of the educational process at different levels of education and high-quality training of teachers to ensure an increase in the potential of their methodological and didactic work (Grigorev, 2020). The recommended core competencies can take a strong position in implementing the correlation of "digital and humanistic directions" of the development of modern society, taking into account the realities of Industry 4.0 (Bochkareva & Mubarakshina, 2019).

Proceeding from the need to maintain the socioeconomic and managerial efficiency and competitiveness of the systems of higher education at a high level, let us disclose the current problems of digital education in Russia, visible in the context of existing global experience:

- Rather late orientation to the global digital marketplace. Since 2004, 83% of universities in the USA and 77% of European universities had the appropriate technology, methodological tools, and teaching staff to provide distance learning (Naletova, 2020). Digital technology is dynamically developing. The strongest competition motivates players on the digital market to produce advanced versions of the information product and constantly implement innovation in the environment of informational, educational content. The twenty-first century is marked with a tendency when the struggle for students will be conducted on an international scale (Ignatova, 2017). The reason for the current state of affairs is educational autarky, localization of attention to internal recipients of digital content, and exaggeration of the size of this market. Nowadays, several Russian universities carry out a serious modernization in the aspect of global digital learning. Nevertheless, most regional universities voluntarily accept their place in the periphery; they cannot create competitive digital products. The vast majority of Russian online courses are simulations of face-to-face classes over the Internet;
- Language barrier. Currently, global information resources, publications of the world's best universities, and lectures are available only to English-speaking users. This circumstance is temporary since the modern digital market shows a high rate of development of AI, which may lead to the emergence of automated systems capable of analyzing speech to translate texts (Safuanov, Lekhmus & Kolganov, 2019);
- Insufficient funding for education. Not all Russian universities are technically equipped to handle digital learning satisfactorily. It is necessary to consider the financial situation of students since not every student can buy a multifunctional gadget;
- Natural dismissal of university teachers, which is inevitable in the substitution of academic teaching methods. In this case, there arises the question of changing the

functional responsibilities of the teaching staff, who will have to conduct digital classes. Another question is the determination of the academic load and salary of teachers. Universities are likely to offer teachers an alternative for the formation of digital content so that blended learning can remain.

Society is gradually recognizing the magnitude of the emerging problems. In recent decades, politicians and academics have repeatedly addressed the need to improve the quality of education. Developed countries have transformed education, allocated financial resources, and made notable efforts to improve the efficiency of educational systems. Nevertheless, the results of a study by the OECD Centre for Educational Research and Innovation (Elliott, 2017) showed that the education systems of the world's leading powers could not overcome the problems of preparing the society to live in the environment of digital transformation. The research (Elliott, 2017) also indicates that the educational reforms implemented over the past decades have had little impact. Currently, the number of jobs in organizations that require applicants to have a high level of competence, including the ability to solve problems using a computer, has increased significantly relative to the 1990s. Simultaneously, the number of workers able to cope effectively with such work remained unchanged (Uvarov et al., 2019).

According to the research on the digitalization of education, the impact of digital technology in terms of maintaining the higher socioeconomic and managerial efficiency and competitiveness of education systems is multidimensional (Bykovskaya & Rybina, 2020).

There are both positive and negative reviews of digitalization in the literature, which should be studied regularly. The digitalization of higher education is believed to be an objective process expressing the general logic of the transformation of the digital society. Meanwhile, this process is associated with certain social risks affecting specific social groups (in the example given—teaching staff and students) and the most important social institutions. Such risks must be researched and systematized so that the development of digitalization can be controlled and its negative consequences minimized to the maximally possible extent (Perminova, 2020).

Let us highlight the main risks and limitations of the digitalization of higher education. They are as follows:

- Social passivity is a limitation that emerged due to the reluctance of social groups and certain institutions (legislative and executive system of power, training structures) to change in accordance with the priorities of digitalization. An isolated example of this limitation may be the unpreparedness of educators to make the rapid transition from academic instructional technology to digital change in their working lives;
- The importance of the teacher in the learning process is a limitation that entailed the impossibility of permanently removing live interpersonal communication from the educational process and its total automation or conversion to an information format. Humans are social creatures that cannot do without live communication to improve fully. Despite recent widespread belief, the human factor (not digital learning tools) acts as the strongest motivator for learning activities;

- There is a risk of excessive "digital optimism"—an overestimation of the capabilities of the information educational environment, technical resources, and tools of the educational process, in conjunction with underestimating the importance and role of the teacher in learning activities. It is assumed that the implementation of the concept of digital education will entail a significant reduction in the importance of the teacher in the educational process with a significant increase in the importance of self-education using digital technology. Simultaneously, the information educational environment, distance learning, and other educational resources are perceived as independent tools that can guarantee the high efficiency of the learning process. Meanwhile, in countries that are more developed than Russia, the hope of transforming the educational process on a mass scale toward online education has not been confirmed. According to the University of Pennsylvania, in 2013, of all subscribers to online courses on the Coursera platform, about 30–70% learned at least a single lecture, and only about 2–14% mastered 50–100% of the course (Bilenko et al., 2019). In this sense, it is indicative of the recognition of the world's futurologists that teacher-assisted learning is likely to maintain its key position and continue to be the most effective form of learning (Uvarov et al., 2019). Thus, if additional conditions are not provided for students to work on the effective use of resources of information and educational environment, there is a risk of turning distance learning into fake or imitation training;
    - The practice-oriented nature of learning requires the organization of the practical part of the educational process in certain areas of training due to the need for personal interaction between teacher and student to form complex professional competencies. This restriction is fixed in Russian legislation.
    - The quality of the technical equipment in the digital learning process can serve as a significant limitation impairing pedagogical performance. Thus, according to one of the questionnaires completed by students studying in the distance form of education, they are mainly hindered by problems with the Internet (53.2%) and sound defects (20.6%) (Bilenko et al., 2019);
    - The system of sanitary and hygienic restrictions says that the educational process must consider the nature of the adverse effects of digital tools on students' health and their physiological, emotional, and psychological well-being. The negative effects of excessive work on the PC include vision deterioration, various indicators of fatigue, neurological symptoms, etc. Sanitary and hygienic restrictions become extremely important when working with students in secondary vocational education programs;
    - There is a risk of deformation of thought activity, worldview, and axiological orientations system. Achieving the goals of the educational process—mastering professional competencies, ensuring professional and personal growth, and socio-professional adaptation of the individual—prescribes to seek a flexible combination of information, material, and educational technologies. There are limitations associated with the dehumanization of social institutions, leading to a loss of educational benchmarks in education, concentration on the

narrow focus of the training of future specialists, and the lack of personal growth;

- There is a risk of the dictatorship of the creators of digital tools caused by the lack of initiatives of the higher school as a customer of information educational products. Consequently, many digital products regarded as educational are not focused on pedagogical goals at all. Instead, they provide solutions to the less essential tasks, which, in some cases, are not even directly related to the educational goals;
- Ethical limitations of digitalization of higher education systems are primarily due to the accumulation of a large body of personal information about students (including data on health, personal and psychological qualities, value preferences, social contacts, and success rates in a variety of activities);
- Management risks are associated with the digitalization of higher education. They include the following:
  - Digitalization is performed for utilitarian purposes, making the learning process cheaper, more primitive, and more regulated;
  - Haphazard and hasty changes, voluntarism, and insufficient orientation of the made decisions on the requirements of science;
  - Focus mainly on formal results of "bureaucratic quality" of education, inattention or insufficient appreciation of the content, and meaningful results of the social and didactic value of the digital learning process.

The reduction of management risks requires the following:

- Organization of scientific developments of digitalization and the information educational process of higher professional education, including the organization of a network of research platforms based on educational institutions, information and educational networks, and research and production clusters;
- Organization of meaningful integrative observation of the implementation of digitalization of education;
- Systematic advanced training of teachers and education management specialists for developing appropriate competencies to act effectively in the educational information space;
- Creation of a set of methodological developments for the heads of higher educational institutions, teaching staff, masters of vocational training, and teachers of additional education for activities in the information educational environment.

38.4 Conclusion

Thus, the digital transformation of education is, above all, the updating of planned learning results, the content of the educational process, methods and technologies of learning activities, and the evaluation of achieved indicators in a rapidly evolving information environment to radically improve the educational achievements of each

student. The difficulty lies in the need to combine the following in a single learning process:

- Mastery of preselected semantic content (socially assigned);
- Attainment of externally formed and discretionarily selected goals;
- Preservation and improvement of students' ability to learn, generation of educational independence, cultivation of students' identity in mastering socially predetermined, and individually selected meaningful content.

Digitalization forms the conditions for implementing this task through the development of ways to plan and organize the learning process, extensive use of active forms of learning, and the transition to the individual, effective organization of the learning process.

The digital transformation of education to maintain the high socio-economic and managerial efficiency and competitiveness of higher education systems is an activity for years to come. It covers all levels of the educational system and involves all stakeholders: students, teachers, management professionals, including parents and employers, policymakers, community representatives, etc. This work combines three directions:

- Development of digital educational infrastructure;
- Improvement of informational educational and methodological developments, tools, and servers, including digital assessment;
- Creating and replicating new ways of organizing educational activities.

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Chapter 39
New Perspectives in Business Education: Key Topics, Digital Technologies, and Learning Partnerships

Anzhela M. Salogub, Nina V. Demina, Liya R. Mkheidze, and Marina V. Chistova

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39.1 Introduction

In a society whose functioning is based on knowledge and innovation, education plays a key role, especially in its segment, such as business education and corporate training, which provides training for innovative management personnel capable of working with any level and scale of complexity.

The world is changing radically, and it is necessary to meet these challenges. We are rapidly moving into a digital society, a society of science, where the primary factors of social inequality will be, in our opinion, such as access and ownership of information, the amount of knowledge, and money will become a secondary factor.

The growing automation of production, the introduction of neural networks in every chain of the technological process, the growth of knowledge and intelligence intensity in the production cycle and work processes, the improvement of the standards of qualification and education, the organization of the work of virtual teams and collectives require a completely new quality of personnel. Their attraction, retention, and development are the "headaches" of any modern entrepreneur.

A. M. Salogub · N. V. Demina · L. R. Mkheidze · M. V. Chistova (✉)
Pyatigorsk State University, Pyatigorsk, Russia
e-mail: marilyn@bk.ru

A. M. Salogub
e-mail: salogubam@yandex.ru

L. R. Mkheidze
e-mail: lika87m@rambler.ru

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The current situation has created a "new normal" for business education: the transition to online training; the development of new skills; new approaches and technologies in training; experience and best practices in education during the pandemic; high-quality customer experience in online training.

In the world discourse, these problems have been discussed by experts for the last five to seven years (Ellenberg, 2014). The pandemic has accelerated the movement towards digitalization of the global economy and global society, to some extent overcoming the differences between traditionalists and supporters of digital development.

39.2 Materials and Method

There is a strong opinion among experts that business education, unlike academic training, is dynamic, advanced, and innovative (Fig. 39.1). The forced time-out caused by the pandemic demonstrated the resistance of the entire educational system to changes.

A survey of directors of corporate training departments at 70 leading Russian and foreign business schools showed that 65% of corporate programs were canceled or postponed. This is a characteristic sign of an unprecedented situation in the education system in all countries of the world. This required not only a rapid restructuring of educational technologies, the transition from offline learning to online learning, but also a dramatic change in the demand for various types of programs, increased requirements for the effectiveness of training in the context of the need to save the budgets of both educational organizations and companies. Will these changes become part of the "new normal" in business education? What educational approaches and technologies will be preserved after the pandemic?!

Modern companies choose education as a strategic priority, including due to the fact that education is a key element on the basis of which digital transformation is carried out and an innovative business organization system is built more effectively.

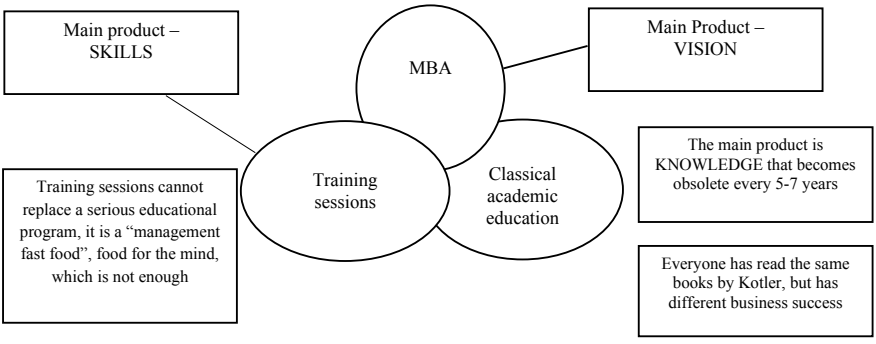

Fig. 39.1 Modern system of business education. *Source* developed and compiled by the authors

39.3 Results

The current situation has created a "new normal" for business education, in which we highlight a number of key topics.

First, personalization (customization, individualization) of learning through platforms. Artificial intelligence, digital technologies make it possible to build an individual learning trajectory of the trainee in accordance with his expectations and tasks, to form development programs by types of skills and by key roles.

In the vast majority of cases, teachers are the owners of a repressive superego. The teacher's duty is to change others, without changing himself in any way. Magister in ancient Latin means "three times more…." In classical European literature, a maestro is three times superior to others, i.e., a teacher.

(1) he knows the same thing as everyone else;
(2) he has knowledge predetermined by symbols, i.e., he knows the technique;
(3) he knows how phenomenology and being are connected (Meneghetti, 2015).

A teacher is one who is able to create truth on the three levels mentioned above, which is why he is three times superior.

The teacher, if he decides to help the learner, notes one of the points, but without specifying everything, because he knows that sooner or later the student will find himself in a situation that will require him to create in conditions of absolute novelty, because being offers something new to each individual (Korgova et al., 2013).

Today, the role of the teacher in the educational process is transformed from the authoritarian role of the knowledge carrier—to the moderator of discussions, to the coach and mentor, the facilitator of the project team.

Secondly, digitalization. This is the most serious challenge for business education. We are living in the era of the Fourth Industrial Revolution, in which very soon all enterprises and organizations and all employees will become "digital." Digitalization has transformed not only the physical space of business schools and campuses,but it has also revealed the limits of the traditional model of education, its limitations and inability to further develop without radical restructuring: out-of-date content; lack of new content; lack of comprehensive programs and platforms, services; lack of training material for the development of skills of the XXI century (digital and soft skills); the resistance of the educational system to changes; the lack of development of the infrastructure of business schools (Fig. 39.2).

Before the pandemic, digital technologies played the role of an auxiliary tool, today they are an element of hybrid learning and a driver of change. Platforms and services allow to save the teacher from the routine and free up time for individual work with the audience. Business schools and corporate universities have actively begun to invest in digital learning, which highlights the priority areas: digital content; digital learning platforms and their transition to services; increasing the number of digital learning teams.

The correct organization of the online training will become the most important competitive advantage of business education and will not only reduce costs and

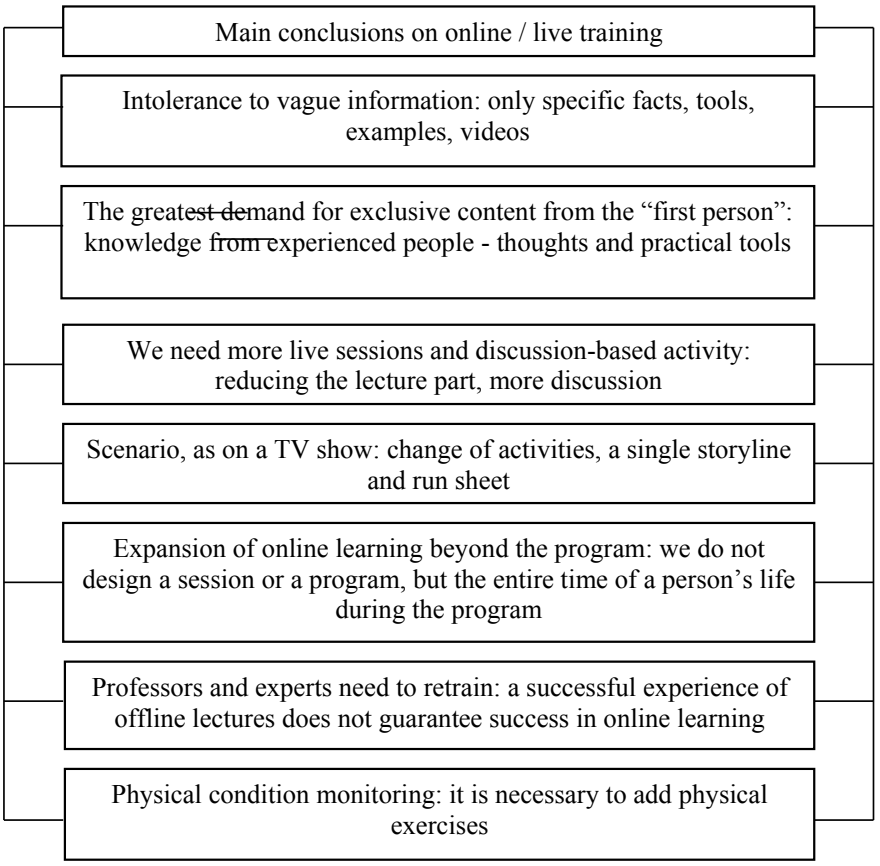

Fig. 39.2 Main conclusions on online learning. *Source* developed and compiled by the authors

end the routine, but also form its exceptional competence. However, it is worth remembering that online training is carried out on special digital platforms, the work on which has its own specifics and nuances. For example, digital platforms allow students and teachers to communicate in the "here and now" mode at any time convenient for them, without waiting for scheduled meetings. Such spontaneous communication gives students the opportunity to reduce the time to get the necessary information and instantly learn something new, and teachers in "real time" to adjust and personalize the "standard" learning process, turning it, in fact, into an "individual" for each student. Also, the use of digital platforms makes it possible to bring "informal interaction" to training, which is especially important for creative people and employees of innovative organizations, i.e., for all those who form a modern business environment (Salogub & Galan, 2020).

At the same time, it is important to remember that everything cannot be "digitized" and moved to online mode. So, if the use of big data technologies and the

digitalization of routine operations will allow educational organizations to significantly optimize and improve the educational process, then personal communication between the carriers of best practices and new knowledge and the trainees, on the contrary, should remain more offline, since it is "live" communication in most cases that allows existing experience to generate new experience, enrich intuition as a source of creativity (Salogub & Galan, 2020).

Also, personal communication is especially valuable when experts are "stars," i.e., experienced experts, as "live" communication with them cannot only contribute to the acquisition of new knowledge and skills, but can also become a source of positive emotions, drive, and creativity (Salogub, 2019).

Third, from knowledge to skills (soft skills, digital skills). A few years ago, business school programs did not include courses such as big data, blockchain or distributed technologies, artificial intelligence, agile strategy, or the impact of neuroscience on the potential of a specialist, risk assessment, or sales performance. These terms themselves were unknown, but now they are included in all serious MBA programs (Farrokh, 2017).

In recent years, neuro- and behavioral sciences have made a giant leap forward, which has resulted in a shift in the emphasis in management programs both in the best business schools in Russia and in the world toward the development of flexible competencies.

At various times, many studies have been conducted on the subject of personal effectiveness in the profession, which have shown that, if in theory, it is important for an effective manager to have both intelligence (general abilities) and knowledge, skills, and abilities (specific abilities), in real business practice, the most effective managers are people with no high or low level of intelligence, having a practical mind and certain specific abilities (Korgova et al., 2013).

Obviously, the results obtained do not mean that only a person with a low or not high level of intelligence can necessarily become an effective manager in practice (Tsapkin, 2010), it is simply a trend that suggests that in the realities of digitalization, there is a shift in the emphasis in assessing the effectiveness of a manager from general abilities to soft and digital skills.

Therefore, today it is largely soft skills, which are non-specified, but important skills that cut across the entire professional activity of a person, regardless of the sphere of their application, and are able to provide him with a quick entry into the professional environment, high productivity and successful performance of all functions, and also have an impact on the formation of the basis of personal efficiency and competitiveness of the individual in the labor market (Mkheidze, 2020). This includes social, cognitive, and emotional soft skills. And, therefore, social and humanitarian knowledge becomes dominant!

In addition, it is worth noting that a special role today is acquired by the possession of digital skills or a group of digital skills, which in many respects act as a universal category of a modern specialist. In this regard, business education motivates students not only for professional and personal developments, but also for development in the digital sphere, which affects the change of traditional, for example, professional qualities.

Fourth, the continuity of learning. In modern conditions, there is a shift in emphasis in personnel training more than ever before. It is no longer employers who are interested in training their employees, but employees themselves are actively learning, developing their skills, gaining new knowledge in new areas, which informs us about a situation in which employees, especially young and middle-aged, do not have an obligation to study, but feel the need to do so (Demina, 2011). Modern business schools, attracting students who are motivated to gain new knowledge, form the right habits and skills, the most basic among them is independent learning. This requires a fundamental knowledge base, a synthesis of science and education.

Therefore, the strategy in the field of education for enterprises that are developing quickly enough should be diversified, in other words, it should consist of such a set of competencies that could be changed quite easily and with the least expenditure of resources if the labor market begins to experience serious shocks. And for these purposes, modern business education has a huge complex of traditional and innovative technologies and forms of training (Korgova et al., 2017). The development of pedagogical engineering and the digitalization of business education have allowed to change the very approach to the learning process. And if earlier it was aimed mainly at the simple transfer of knowledge and information, today, its most important component is the possibility of obtaining a high-quality educational service that is not limited to a specific physical location and does not have time restrictions on its provision (Ilyin, 2009). The increasing spread of such heuristic learning will allow any student to independently build an individual trajectory of their education, develop their personality, and be both a subject of the educational process and its organizer and designer. So, first of all, such education should be aimed at the development of creativity, self-knowledge, and self-development. And this is explained simply: only by constantly acquiring new knowledge and skills that can tend to become obsolete quickly enough, a person can remain successful and competitive in the labor market (Salogub & Galan, 2020).

Table 39.1 shows the differences between traditional and modern types of education.

Fifth, the private market and localization. Education in Russia is the prerogative of the state and is under its strict control. It is the Russian state, represented by higher education, that acts both as a customer, as a performer, and as a regulator of the educational services market in our country.

The exception was the corporate education segment. The situation began to change under the influence of objective factors. Foreign participants of the educational process began to come to the market, and a number of Russian players represented their interests in European markets. Now there is exactly the opposite trend—localization. Business schools are localized in a specific market and create content that is close to the realities of specific organizations and to the problems of their own country. This makes it possible to bring business education closer to real life, to practice, to apply technologies and tools that meet the expectations of students. The theory of personalized pedagogy is impossible without an open market.

Sixth, a safe environment. Creating a safe environment is a key element of the modern business education system. The physical space of campuses and schools is

Table 39.1 Comparative characteristics of traditional and modern types of education. *Source* Developed and compiled by the authors

Areas of analysis	Traditional type	Modern type
Focus	On standards	On the variability
Time vector	Reconstructing the past	Creating the future
Motivation	Gaining knowledge	Self-realization and self-development
Information	Consistent, given in a "ready-made" form	Alternative, variant, the search is carried out independently. Producing your own ideas
The process of cognition	It is based on the learning of existing standards and other people's experience	Based on transformation and discovery
Thinking	Convergent (Logical)	Convergent and divergent (creative) are
Results	Planned, known	Probabilistic, unknown
Subject-object relations	The person is the object of training	Man is the subject of knowledge and creativity
Technologies	Imitation, reproductive	Problem, cognitive, heuristic, creative, art technologies, digital services and platforms
Training moderator functions	Authoritarian influence	Partnership, coaching
Effects	Thesaurus of academic knowledge, algorithms	Reflection on current achievements and motivation of prospects

being rebuilt to preserve the health of employees and students, online registration for programs is carried out using digital services, and the educational process is carried out in parallel: a Russian professor is in the audience, and a foreign professor is connected to an online discussion in real time.

Seventh, partnership and open collaboration. For many companies that organize corporate training, education is not the main activity. For a classical educational organization, the development and implementation of digital technologies and platforms is a very difficult process. The "new normal" allowed to strengthen the multimodality of education, created opportunities for hybrid learning, for a combination of physical and virtual space. Today, business education needs an upgrade (Fig. 39.3).

Educational organizations cannot resolve such challenges on their own. For a long time, in order to retain customer interest in their educational programs, business schools tried to maximize their internal capacity and expand their product line.

Today, effective methods of innovative education are outsourcing and crowdsourcing, technological partnerships with leading media structures, IT companies, and open collaboration with organizations operating outside the education industry. Bright examples are the educational activities of the BEAC, RBC, and FORBES (Salogub, Demina, & Chistova, 2019).

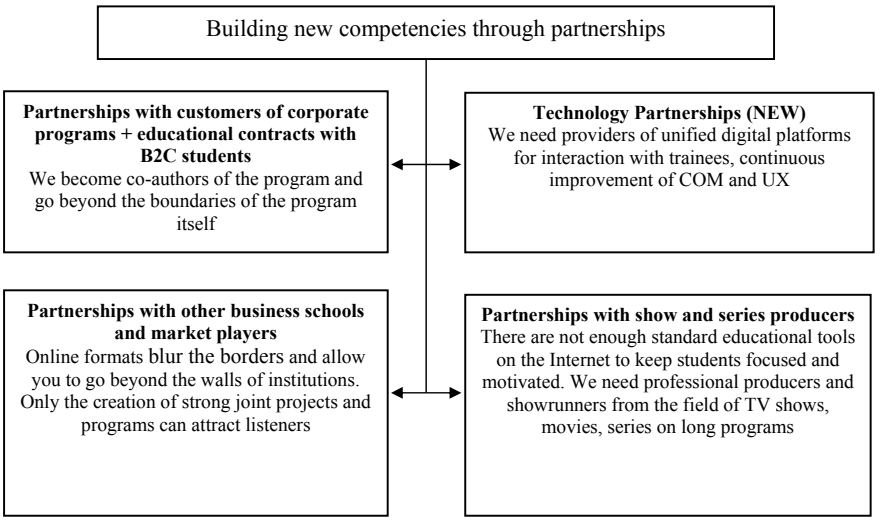

Fig. 39.3 Social partnership. *Source* Developed and compiled by the authors

The agents of the innovative education industry should unite in a consortium to build a new market and new standards of education!

The only way to ensure Russia's security is development based on innovation. The problem with such a strategy is the complexity of its implementation. The competitive advantage of a country, an organization, regardless of the field of activity, should be tangible, not illusory, based on the ability to use unique skills and opportunities. In other words, the basis of such an exceptional competitive advantage should be the innovative potential, which is difficult to create and develop, but which make it possible to accumulate and transform new knowledge and skills into the competitiveness of the country, regions, enterprises, goods, services, etc. (Pisano, 2020).

39.4 Conclusion

The COVID-19 pandemic, which led to a mandatory time-out and the organization of remote work of employees, forced a rapid reform of business education in the direction of innovation. This has put forward new requirements for both Russian education in general and business education in particular:

– first, it is necessary to improve the quality of training, make adjustments to the structure of its content, and increase the level of digital knowledge and skills among the teaching staff in accordance with the ongoing digitalization in the industry;

- secondly, it is necessary to use modern learning technologies, actively introduce hybrid forms of learning that allow students to build individual learning paths using digital platforms and systems, as well as transform existing educational systems into innovative ones;
- third, it is necessary to integrate education, science, business, and society within the framework of social partnership and international collaboration;
- fourth, it is necessary to introduce innovative forms and educational technologies aimed at creating an effective system of continuing education in the educational process everywhere;
- fifth, it is necessary to develop its own research and innovation potential of the education industry;
- sixth, it is necessary to develop all forms of business education to train qualified, innovative-minded and creative employees for Russian companies;
- seventh, it is necessary to develop non-state higher education, as well as more actively use the unique advantages of corporate universities and business schools to improve the education process;
- eighth, it is necessary to give more freedom to educational institutions to organize and carry out commercial activities.

Steve Jobs, Bill Gates, Mark Zuckerberg, Sergey Brin—these names are often cited as examples when they say that education does not equal success. These world business legends dropped out of education in its classical format (and educated themselves through independent study: reading books, learning from professionals, traveling and communicating with new people, building up their social competencies and emotional intelligence) [9].

One of the non-standard methods of gaining knowledge is the creation of an ecosystem where students get into the vanguard of business events, can promote their business, generate new startup ideas, where there is a concentration of thoughts of successful people and scientists—all this contributes to insights, motivation for development, and the search for new sources of knowledge.

In the next 10 years, the country intends to implement a digital transformation of public administration and all spheres of the economy, to automate the provision of most services. The technologies and tools developed during the pandemic should become part of the modern education system and integrate into future remote learning skills.

According to the new concept of innovative business education, its content should include:

- content of knowledge about a modern company (classification and typology, individual and organizational knowledge, culture of knowledge exchange, the problem of their objectivity);
- the essence of intellectual capital (definition, its components, the concept of intellectual property and intangible assets, methods of their assessment and measurement, ways of increasing and commercializing);
- the relationship between knowledge management and innovation management (how to innovate by combining, transforming, creating and applying knowledge, how to translate knowledge into innovation, developing one's own creativity);

– methods of practical knowledge management (the essence, trends, initiatives, and the main types of practical knowledge management, know how to evaluate, audit knowledge, how to build an organization's innovation management system, how to overcome the economic and sociocultural causes of anti-innovation behavior).

An effective strategy for developing innovative business education through partnerships with other industry participants is to create an ecosystem that makes it possible to implement two key components of the system-business elements and technological elements of the ecosystem, i.e., integration of all services and creating a complete customer experience guide to receive any range of services, regardless of location. Digital technologies are a breakthrough in the development of business education and humanity.

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Chapter 40
Didactic Effectiveness of Distance Learning in the Context of Digitalization of Higher Education

Elena Yu. Sizganova, Anna K. Kaydashova, and Andrey A. Ashin

JEL Codes I21 · I23 · I25

40.1 Introduction

The current education system is a social sphere that actively responds to any significant changes in the country and the world. This is due to such characteristics as its inclusion in social development, the interdependence of subjects of the educational process, adaptability to the conditions of social development, and dependence on the processes occurring in society. On the other hand, researchers often note the conservatism of the system due to its traditionalism and focus on achieving established values, goals, and guidelines for the humanistic development of society to preserve the integrity and effectiveness of the system.

Due to the unpredictability of the critical situation created by the pandemic, there arose several circumstances that necessitated a rapid and total change in the format of education. Some sources even mention the term *distance learning in extreme conditions* (Interfax Education, 2002). The global community perceived the transition to such a model of training with dismay (Concept Note, 2020).

The Ministry of Education and Science of the Russian Federation marked the transition of all subordinate universities to distance learning in March (Portal of the Federal State Educational Standards for Higher Education, 2020). Several problems of the digitalization of education arose as a natural consequence of this forced accelerated transition. For example, the report of the Higher School of Economics presented the results of monitoring, which showed that 25% of families could not provide children with the opportunity to study remotely (Zair-Bek et al., 2020). Students saw

E. Yu. Sizganova (✉) · A. K. Kaydashova · A. A. Ashin
Vladimir Branch, The Russian Presidential Academy of National Economy and Public Administration, Vladimir, Russia

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a problem of lack of appropriate working conditions for distance learning (Interfax Academy, 2020). Another problem is the low level of digital competence of teachers at Russian universities. Moreover, some aspects of digital didactics are weakly developed, which is especially noticeable when traditional educational content is transferred into a digital form (digitized). In general, digital didactics is considered part of modern teaching practice, which allows one to organize the learning process using digital technology (Blinov et al., 2019). It is important to emphasize that digital didactics relies on the didactic postulates developed by pedagogical theory and practice over the centuries (Lukshi et al., 2018).

Many works are devoted to studying the features of distance learning. There is a certain experience of teaching in a digital format. Nevertheless, speaking about the effectiveness of distance learning, it is necessary to pay particular attention to the need to develop new approaches based on the laws of traditional didactics. In this regard, this research aims to identify the pedagogical conditions of didactic effectiveness of distance learning in higher education. The research objectives are as follows:

- To characterize distance learning as a didactic unit of the educational process in universities;
- To analyze the results of assessing the effectiveness of distance learning;
- To formulate conclusions and suggestions for improving digital learning in the system of higher education.

40.2 Materials and Methods

During the research, the authors implemented the following scientific methods:

- Theoretical—analysis, synthesis, generalization, classification, and modeling;
- Empirical—interview, included observation, and descriptive statistics.

The choice of these methods is determined by the need to implement an integrated approach to the research, allowing to reduce subjectivity in the analysis of results. The choice of methodology to achieve the research purpose is associated with a set of indicators to identify the effectiveness of the conducted classes. In determining these indicators, the authors studied the methods of assessing the effectiveness of learning developed by Donald Kirkpatrick (Kurt, 2016) and Jack Phillips (Phillips & Phillips, 2016). These techniques are actively used in business to assess the effectiveness of personnel training, including online training. However, the emphasis is placed on the economic effectiveness of the training; that is, it is aimed at evaluating the effectiveness of the staff trained in terms of profitability for the enterprise (Udovidchenko & Kireev, 2014). In education, this dependence is not decisive, since, along with the economic objectives (e.g., training the required number of personnel with appropriate qualifications for the national economy of the country), it implements the goals of the harmonious development of personality, education of civic consciousness, the basics of cultural identity, the desire for self-development, etc.

Kirkpatrick's model is the most appropriate for our research since it can be used to assess the effectiveness of a particular lesson and assess the effectiveness of the learning process as a whole (Kirkpatrick & Kirkpatrick, 2008). We borrowed the idea of assessing the didactic effectiveness of the lesson at several levels. At the level of *reaction to learning*, questionnaire methods and the method of observation were used. The survey involved students of the Vladimir branch of the Russian Presidential Academy of National Economy and Public Administration (RANEPA), studying in the training program 38.03.04 "State and Municipal Management." The sample includes 107 students, of which 62 are full-time students (average age—20 years), and 45 are correspondence students (average age—35 years). The coverage of the interviewees was continuous and uniform. Respondents were offered a questionnaire with ten open questions. The statistical data was mathematically processed. During two months of distance learning, teachers in the Department of State and Municipal Management kept records of observations of students, the conclusions of which were correlated with the results of our survey. The second level *learning* involved assessing such an indicator as the level of assimilation of educational material by students. This stage used small tests and quizzes conducted by the teacher at the end of each lesson. When measuring the indicators at the level of *behavior*, we used the assessment of the results of students' work in carrying out practical tasks. This allowed us to analyze the level of formation of skills in students. We identified high (4.6–5 points), average (3.6–4.5 points), and low (2–2.6 points) levels for each of the indicators. Each of the levels corresponds to a certain number of points according to the traditional five-point evaluation scale.

40.3 Results

Considering an online lesson as a didactic unit of a complete learning process, we focused on the indicators allowing us to assess the procedural and temporal framework of the organization and conduct of the online lesson on the LMS platform (the level of *reaction to learning*). These indicators include the optimal duration of the lesson, peaks of concentration and efficiency of students during the lesson, the most productive types of work, the causes of reducing the students' cognitive activity, the level of mastering the material studied, and the formation of the ability to apply the material learned in practice.

Let us turn to the results obtained during the study (Table 40.1). Analyzing the survey results, we note the following. Most full-time (42.9%) and correspondence students (40.4%) indicate that 60 min is the optimal duration of a class in online learning. However, a similar number of respondents identify a class length of 80 min (37.2 and 36.1%), which coincides with the length of classes officially defined in the pandemic. There are also students willing to study only 45–50 min, or those who need 90 min. The views of students whose average age is 20 years differ significantly from the views of students whose average age is 35 years. This may be connected with

Table 40.1 Results of the student survey (%)

Indicators	Full-time students	Correspondence students
Optimal duration of the class		
45–50 min	17.1	8.7
60 min	42.9	40.4
80 min	37.2	36.1
90 min	2.8	14.8
Highest level of attention (for a class duration of 80 min)		
First 15–20 min	30.7	48
First 30 min	19.2	17.6
First half of the class (40 min)	23.1	19.6
Beginning and end of class (10 and 60 min)	11.6	0
Throughout the class	3.8	11.7
Second half of the class	11.6	3.1
Time to switch to other activities during the class (for a class duration of 80 min)		
In 10 min	3.5	0
In 20–25 min	15.6	11
In 40–60 min after the start of the class	42.4	10
Fifteen minutes before the end	24.7	12.2
When it gets boring	6.9	45.1
I do not get distracted	6.9	21.7
The moment of the highest working capacity during the class		
First 15–20 min of the class	23.5	7.7
First half of the class	11.8	7.7
In the middle of the class	26.5	15.2
In the middle and at the end of the class	8.8	7.5
Last 30 min of the class	2.9	7.3
When performing the task or answering the question	14.7	39.4
During group work	2.9	15.2
Throughout the class	8.9	0
The most productive types of work in class		
Discussion and debate	18.6	33.4
Lectures with presentation	22.7	10.8
Analysis of information on the topic	2.3	11
Presentation, video	17.3	11.5
Dialogue with the teacher	9.4	5.5
Group work	20.1	27.8
Tests	4.7	0

(continued)

Table 40.1 (continued)

Indicators	Full-time students	Correspondence students
Creative tasks	4.9	0

Source Compiled by the authors

the age features of the younger group of students, such as high emotional sensitivity, unstable attention, and the desire for activity (Vygotsky, 1999).

The majority of students note the peak of concentration in the first third of the class (30.75 and 48%). Then comes the group of respondents whose attention span is highest at 30–40 min of class. There are full-time students (11.6%) who are attentive at the beginning and the end of the class, in the second half of the class (11.6 and 3.1%), and even during the whole class (in this case, the percentage of respondents is relatively small among full-time students (3.8%) and somewhat higher among correspondence students (11.7%)).

Significant differences can be seen in the stability of cognitive activity of full-time and correspondence students. Thus, full-time students are easier distracted—only 6.9% of them do not switch to other activities during the class compared to 21.7% of correspondence students. Moreover, 42.4% of full-time students are distracted in the middle of the class, while most correspondence students (45.1%) switch their attention if the material is not interesting to them, regardless of the time of the class.

Respondents noted the peak of efficiency mainly in the middle of the class (26.5% and 15.2%, respectively). However, correspondence students noted high efficiency at the time of performing the task or answering the question (39.4%), regardless of the time of the class. In our opinion, this circumstance confirms a more stable target orientation of these respondents and their motivation to receive a profile education. The motivated group of students usually notes that performance is high throughout the lesson if it is interesting, carries practical value, and the teacher is interested in interacting with the audience. Group teamwork is considered the most productive activity in the online class by students of both groups (20.1% and 27.8%, respectively). However, discussions are preferred by correspondence students (33.4% and 18.6%, respectively), and lectures are preferred by full-time students (22.7% and 10.8%, respectively). These indicators can be associated with the orientation of correspondence students to practical activities and the formation of their own life position, while students in the age group 19–22 years may still be in the process of professional and personal self-determination.

According to the observations conducted by the teachers, we can conclude that the most productive duration of lecture class is 60 min. In turn, in the case of using interactive forms of work, practical training should last at least 90 min. The highest level of attention is noted in most students in the first half of the class. The thread of the lesson is mainly lost in its last third (20 min before the end). Teachers consider interactive forms of interaction to be the most productive types of work in the classroom. Low performance of students is noted in the first half of the practical lesson, which is associated with the slow inclusion of some students in the tasks' essence. As for the

Table 40.2 Distribution of students by level (%)

Level (points)		High (4.6–5)	Optimal (3.6–4.5)	Average (2.7–3.5)	Low (2–2.6)
Assimilation of the materials learned in class (*learning*)	Full-time students	13	62	21	4
	Correspondence students	9	52	27	12
Ability to apply learned material in practice (*behavior*)	Full-time students	4	20	61	15
	Correspondence students	2	11	62	25

Source Compiled by the authors

lectures, observers note the difficulty in assessing the performance of students during this type of lesson, since the monological form of presentation does not give such an opportunity. The need to implement an integrative approach in distance learning due to the peculiarities of digital learning is also noted (Sizganova & Kaidashova, 2016).

Let us consider the results of the *learning* and *behavior* levels (Table 40.2).

When evaluating the assimilation of the material studied in the class in full-time and correspondence students, the teachers mostly noted optimal (62% and 52%, respectively) and average (21% and 27%, respectively) levels (Table 40.2, Fig. 40.1).

Comparing the indicators, we should point out the positive results of distance learning in terms of mastering theoretical material for students of all forms of learning (Table 40.2, Fig. 40.2).

A high level of assimilation of knowledge was noted in 13% and 9% of students, respectively. A low level of assimilation of knowledge was noted in 4 and 12% of students. The effectiveness of the lesson in terms of the formation of the ability to apply the learned material in practice turned out to be relatively low. Thus, when the teacher assessed the formation of this skill among full-time and correspondence

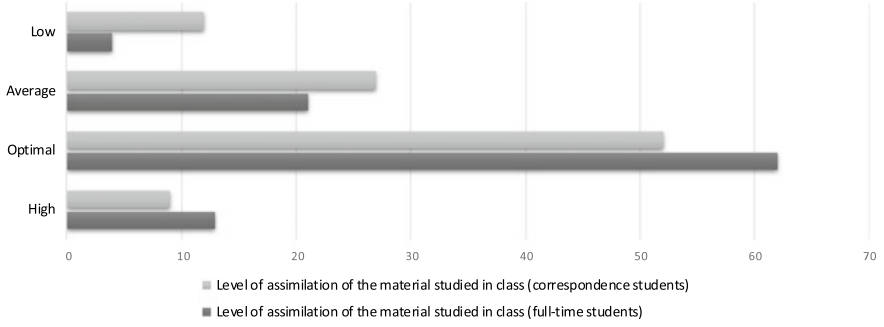

Fig. 40.1 Distribution of students by level of mastering the material. *Source* Compiled by the authors

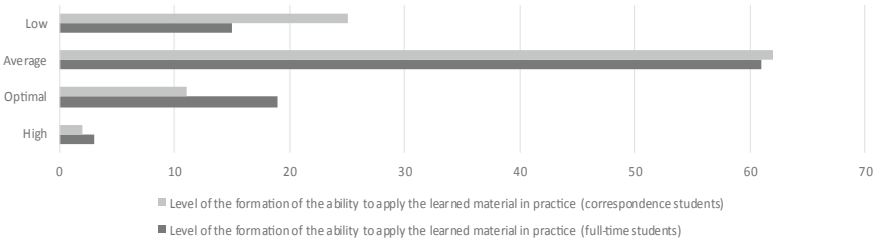

Fig. 40.2 Distribution of students by level of practical skills. *Source* Compiled by the authors

students, the level was mostly average (61 and 62%). A high level was recorded in 4% and 2%, respectively; an average level—in 20% and 11%; a low level—in 15% and 25% of students.

The data obtained allow us to argue that the practical lessons conducted in distance form should be modernized in accordance with the peculiarities of digital learning. In terms of the productivity of the lesson, it is worth noting that some respondents consider online interactions with links to other sites or work in special applications inconvenient to use, because students do not always have the technical ability to use them or they do not have the special skills to work with interactive content. The students name the following main reasons for the reduction of cognitive activity in the classroom:

- Monotony of the lecture;
- Lack of visual means;
- Lack of teacher–student interaction;
- Doing homework at the same time as studying;
- Inability to have privacy during the class;
- Considerable number of participants and the rapid pace of the lesson;
- Overloading with interactive forms of work or digital content.

Comparing the research results with the secondary literature, we can state that the learning process has been previously considered a pedagogical technology not yet transformed into a digital context (Babansky, 1977; Bespalko, 1989; Verbitsky, 1991). There is also a detailed methodology for evaluating the effectiveness of distance education (Kazimov, 2020). In this methodology, the authors propose using several vector indicators for analyzing the conditions for the use of digital technology in vocational education, which should be evaluated using methods of mathematical analysis. In this case, they consider the effectiveness of distance learning as the main characteristic allowing to identify the degree of achievement of the goal and the effectiveness of the activity. It is also necessary to consider the results of a prepandemic study on the effectiveness of distance learning (Vindeker et al., 2017). The authors present and analyze the results of a survey of different age groups of students on the development of distance learning in higher education. These results generally correlate with those presented in this study.

40.4 Conclusion

Based on the research results, we can formulate the following conclusions:

1. An online class as a didactic unit of digital education is marked with the accessibility of the learning process, the possibility of implementing an individual approach to the student, and the use of modern educational technologies. However, there are certain limitations to the simultaneous participation of all students in the discussion of problematic issues of the studied topic. Work on the LMS platform provides many options for interaction with remote access. Nevertheless, it is characterized by slow feedback, especially in receiving an emotional response from the audience.
2. To effectively implement the didactic process in higher education, it is necessary to consider the existing differences in the construction of online classes associated with the age characteristics of students, the level of their cognitive activity, motivation for learning, and focus on vocational education. As subjects of the didactic process, the students have some common features. However, full-time students have some prominent features such as orientation in the digital content, discrete perception, predominantly visual perception of educational material.
3. In general, digital education is based on the didactic principles of traditional education. However, it has some features caused by the form and ways of interaction between the learner and the student. In this regard, one cannot simply translate the traditional lecture and seminar forms into a digital shell. It is vital to adapt the class to the online format. The lecture form, being the most important form of higher education and the basis of fundamental education, must undergo certain changes. Nowadays, a lecture should be transformed into an integrated class combining several types of learning activities or a class built around related topics in different academic disciplines.

The research novelty lies in identifying the didactic characteristics and effectiveness of the online class in the conditions of emergency digitalization of higher education. The authors note the following most essential conditions for the effectiveness of distance learning as a didactic unit of digital education:

- Adaptability of the didactic process to the peculiarities of digital education based on the consideration of the optimal duration of the online lesson and changes in the performance of students;
- Development of integrated forms of classes, allowing the use of the full range of digital learning technologies based on interactive teaching methods and the capabilities of LMS platforms;
- Improvement of the technical component of the online distance learning process, both on the part of the higher education institution and the part of the consumer of educational services.

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Chapter 41
Introduction of Lean Technologies in the Organization of Practices of University Students

Zhanna V. Smirnova, Svetlana N. Kaznacheeva, Marina L. Gruzdeva, Elena V. Romanovskaya, and Natalia S. Andryashina

JEL Codes R11 · R12 · R 58 · Q13 · Q18

41.1 Introduction

Modern education today functions in a constantly competitive environment. The main indicator of universities is a rating according to certain criteria for the research activities of the university. The indicators for assessing the effectiveness of the university's work will largely depend on the correct management system, the organization of the university's activities in all areas of its activities.

In today's conditions, universities need their own development strategy for the entire system of organizing the educational process, the work of the team, and individual structural divisions (Romanovskaya, Kuznetsov, Andryashina, Garina, & Garin, 2020).

The main task of universities is the high-quality training of future specialists in various fields of activity (Adzhienko, Kodonidi, Kishchenko, & Krivenko, 2018). The organization of educational activities is based on a competent combination of

Z. V. Smirnova (✉) · S. N. Kaznacheeva · M. L. Gruzdeva · E. V. Romanovskaya · N. S. Andryashina
Minin Nizhny Novgorod State Pedagogical University, Nizhny Novgorod, Russia
e-mail: z.v.smirnova@mininuniver.ru

M. L. Gruzdeva
e-mail: gruzdeva_ml@mininuniver.ru

E. V. Romanovskaya
e-mail: alenarom@list.ru

N. S. Andryashina
e-mail: natali_andr@bk.ru

E. G. Popkova and B. S. Sergi (eds.), *Digital Education in Russia and Central Asia*, Education in the Asia-Pacific Region: Issues, Concerns and Prospects 65,
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educational processes which allows for efficient organization of the learning process as a whole.

Lean manufacturing (in English there are two designations: “lean manufacturing” и “lean production”) is a special management concept in which the main indicator is the speed, efficiency, and quality of the results achieved (Andryashina & Kozlova, 2016).

The history of the implementation of the lean manufacturing process originally arose in Japan. Today, the lean manufacturing process exists in many countries around the world. The practice of using lean manufacturing is applied in a wide variety of areas: construction, information technology, trade, logistics, banking services, etc. (Andryashina, Garin, Romanovskaya, Kuznetsova, & Kozlova, 2020a; Voronov & Semakhin, 2020). The technology of applying lean manufacturing appeared in educational organizations in 2018. At the moment, many universities have begun to implement lean production technologies in their development strategies for more effective educational activities in general.

41.2 Methodology

Scientific substantiation of the application of lean technologies in educational institutions was due to the Federal project in 2016–2017 by the Government of the Russian Federation. The results of the application of lean production at the university were noted by domestic scientists at the All-Russian conference “Lean University.”

To implement a modern management system of an educational organization, new approaches, methods, tools are needed (Andryashina, Romanovskaya, Garina, Kuznetsov, & Kuznetsova, 2020b).

Values and principles of lean technologies: Focus on reducing all types of losses, which mean any actions that do not add value, but spend the time of employees and resources of the organization (Romanovskaya, Kuznetsov, Agafonov, Andryashina, & Artemyeva, 2018). The purpose of lean technologies in educational institutions is to determine the types of losses (excessive reporting, processing, expectations, overload, alteration and scrap, unused employee potential) and optimize current processes in organizations, eliminating unnecessary excessive actions of students and teachers from them. Effective use of teacher time.

The expected effects of implementing lean technology are to increase the efficiency of organizing the educational process (Smirnova, Vaganova, Cherney, Romanovskaya, Andryashina, & Toshin, 2019). Increase the satisfaction of students and teachers. Freeing up time for self-education and creativity, increasing teacher satisfaction.

The strategic goal of introducing lean technologies into the education system is to create an open developing educational environment to achieve a new quality of education, improve the quality of life of participants in the educational process, increase competitiveness and create a positive image of the educational organization (Demina, Karpushina, & Gushchina, 2016).

In total, from 2019 to 2020, 28 educational organizations participate in the implementation of projects to optimize the internal processes of the organization, improve the quality and accessibility of educational services.

During the study, various schemes and methods for applying lean technologies in educational activities were proposed. Among the proposed research ideas, problems were noted in the informatization sphere of the organization of the activities of the university structural divisions, systematization of labor processes of the divisions' management, ensuring a systematic approach to lean management (Romanovskaya, Kuznetsov, Andryashina, Garina, & Garin, 2020).

The research of lean technologies at the university is also affected at the Minin University of Nizhny Novgorod. On the basis of lean production technologies, projects were implemented in educational activities at the university: "Creating an IEE based on the STA-studio concept—project (accession)"—creating an innovative educational environment (IEE), consisting of design solutions for modern educational space, digital pedagogy tools and theoretical and methodological, methodological support for project-oriented team training; "The personal success configurator—the project is completed—information policy center functionality," the result is the creation of an information and educational service, which, based on the desires, preferences, and capabilities of the user, will allow you to develop an individual educational trajectory (Romanovskaya, Semakhin, Aiplatova, & Egorova, 2017). Performance of works arising as a result of the project implementation is included in the functions of the information policy center; "Digital educational environment"—the creation of a stable functioning e-learning system in the university, "sensitive" to the changing needs of the information society, and many other projects related to lean production technologies in the university's activities.

The methodological basis for the research of the use of lean technologies in organizing educational activities was the general methods of analysis and comparative analysis aimed at identifying the effectiveness of organizing the practices of students at Minin University. Based on the creation of a single information space for the practice of university students, it is possible to reduce the time of the process of organizing practical training. For the practical implementation of the organization of the practices of students at Minin University, approaches to the informatization of this process have been proposed, the creation of an electronic section of the organization of the practices of students on the Moodle University platform.

For this purpose, experimental groups were selected at the Faculty of Management and Social Technical Services of Minin University to study the introduction of a single information space of practices of learning groups of SBZ-19, EZS-20, the total number of students is 40 people. The rationale for the choice of these technologies was: excessive data processing, unnecessary transportation of documents, unnecessary interleaving.

The expected result of the research is a reduction in the time taken to process documentation by the head of practice, a decrease in transportation costs for the movement of documents, a reduction in the movement of workers, which leads to an increase in the amount of time spent preparing for the main activity.

41.3 Results

As a result of the research of lean technologies, as part of the creation of a single information space for the practices of university students, a card of the project "Effective organization of practical training of students" was developed in which the stages of organizing the creation of an information environment for organizing training practices are outlined (Fig. 41.1).

The main stages of the project are:

1. Analytical stage
2. Educational stage
3. Lean stage
4. Final stage (justification stage).

As part of the first stage (analytical), a sociological study was carried out. Participants of the study are teachers and organizers of practices at the Faculty of Management and Social Technical Services, students of experimental groups SBZ-19, ESZ-20. As a result of the study, participants were interviewed on the need to develop a single information space for the practices of university students on the Moodle electronic platform. When processing data, we noted: 80% of teachers, 70% of students, consider it necessary to organize lean technologies when organizing student practices, 89% of teachers and 65% of students consider it an effective method to create a single information space for university students, 80% of teachers and 60% of students are ready to work in this system (Fig. 41.2).

It is necessary to take into account the key risks when implementing the project:

– development of a new electronic practice documentation resource;
– complexity of development of regulatory documents accompanying this process.

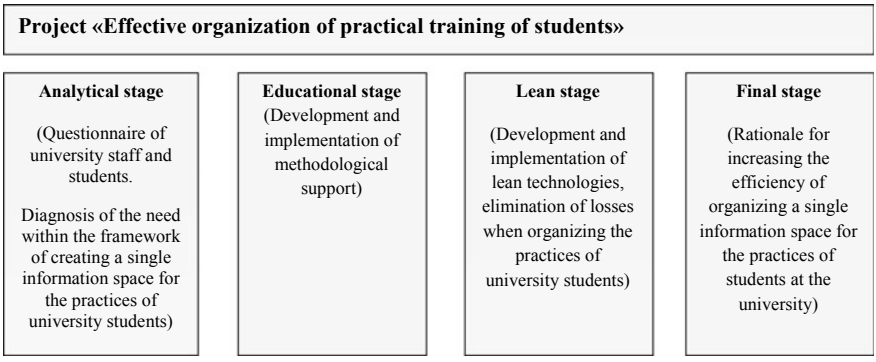

Fig. 41.1 Project card "Effective organization of practical training of students". *Source* Developed and compiled by the authors

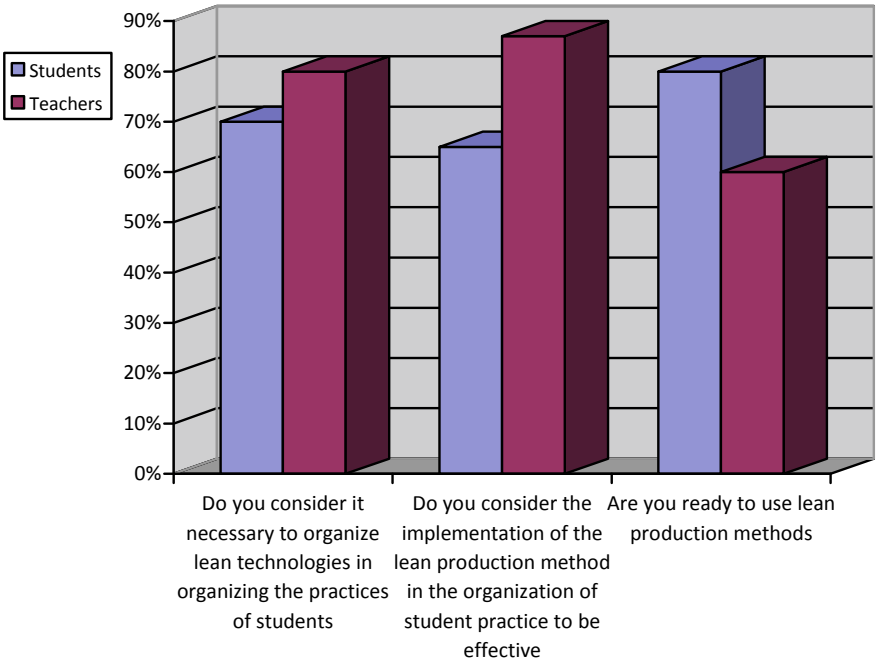

Fig. 41.2 Questionnaire result. *Source* Developed and compiled by the authors

Taking into account the conservatism characteristic of the pedagogical composition of higher education organizations, and the aggravated sense of self-worth associated with high intellectual potential, the problem of involving faculty in the processes of continuous improvement was solved using various methods (involvement through participation, demonstration of the best practices of colleagues, cultivating leadership, moral and material encouragement). In addition, in the process of managing this project, it is necessary to develop a new resource and formalize regulatory documents, which leads to additional time costs for certain structural departments, but this time gap is carried out at a time, the rest of the time for the costs of the new platform is considered cost-effective and effective within the framework of lean technologies.

41.4 Conclusion

Thus, the use of lean technologies in educational institutions when organizing the practices of students provides an opportunity to reduce the time for the registration and movement of documentation for the design of various types of practices. The launched project at the Faculty of Management and Social and Technical Services according to the project card "Effective organization of practical training of students"

helps to successfully change the performance indicators for organizing practices at the university.

In turn, this project approach to the use of lean technologies will increase the effectiveness of the management of educational activities in the field of organizing practices. In view of the above, it should be assumed that the effective implementation of the project "Effective organization of practical training of students" using lean technologies at the Minin University is achievable through the implementation of planned activities using a systematic approach. These proposals are justified by the following statements:

(1) Application of project management effectively in the social sphere of educational institutions.
(2) Project management of efficient production technologies has a number of advantages—achieving results as soon as possible.

Summarizing what was said about the introduction of lean technologies in the organization of training practices at the university, you can submit the following recommendations for the implementation of the project "Effective organization of practical training of students" at the Faculty of Management and Social and Technical Services:

– organization of the project should be carried out in the format of systematization of the work of structural subdivisions;
– involve senior management in the organization of the project;
– maintain a clear synchronism in the execution of project program indicators.

Based on the above, we can argue that the final result of lean technologies in the organization of student practices will give a positive and effective result, improve the indicator of internal work of the university and its employees.

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Chapter 42
Integration of Information, Communication, and Pedagogical Technologies in the Framework of Blended Learning in Classes with Students of Pedagogical University

Zhanna V. Chaykina, Mariia V. Mukhina, Marina L. Gruzdeva, Zhanna V. Smirnova, and Olga V. Golubeva

JEL Codes I2 · I20 · I21 · I26

42.1 Introduction

Modern realities are such that society, its political, economic, social, and spiritual spheres are undergoing significant transformations. The restrictions introduced into the usual ways of carrying out many types of professional activity intensify the process of searching for alternative options for the implementation of the set goals and achievement of the desired results. The education system is experiencing particular difficulties in achieving the planned goals and objectives in the context of the spread of coronavirus infection. It is required to use new means and mechanisms, pedagogical methods, and technologies corresponding to the existing conditions for the successful organization of the pedagogical process. The most popular in this situation are communication technologies that ensure the interaction of participants in the educational process at a distance using the capabilities of the Internet (Malushko & Lizunkov, 2020; Ponachugin, 2020; Gruzdeva et al., 2019).

In this connection, the education system is forced to actively master information and communication technologies, adapt Internet resources for educational purposes, look for new ways of organizing educational activities of students using the electronic environment and distance technologies. Means and technologies of teaching, focused not only on traditional forms of organizing the pedagogical process, but also on the educational process organized in the online space, are becoming relevant at the present time.

Z. V. Chaykina (✉) · M. V. Mukhina · M. L. Gruzdeva · Z. V. Smirnova · O. V. Golubeva
Minin Nizhny Novgorod State Pedagogical University, Nizhny Novgorod, Russia

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42.2 Methodology

Blended learning can be attributed to the modern popular technologies for organizing the educational process.

Blended learning is an educational approach that uses e-learning alongside traditional learning. At the same time, e-learning assumes that the student has the right to choose the time, place, and speed of learning, i.e., he forms his educational route by himself. Such a choice can form the necessary skills for productive planning, control, and self-regulation in students (Abramova, 2014).

Blended learning can be implemented on the basis of different models of organizing educational activities of students. The most popular blended learning models are "flipped learning," "station rotation," "laboratory rotation," "flexible model" (Andreeva et al., 2016; Watson, 2015). Each of the named models can be used in classes with students of pedagogical universities. Let's briefly describe each model.

The authors of the "flipped classroom" blended learning model are American educators Jonathan Bergmann and Aaron Sams, who embodied their idea in educational practice in 2007.

The idea of flipped learning assumes that students study new educational material at home on the basis of educational content posted in the electronic learning environment of the university on the electronic course of the academic discipline, perform test tasks of a reproductive nature. And in the classroom, in the course of communication with the teacher, they analyze the problematic points of a new topic, solve practical problems, cases, and carry out projects and creative tasks. It is rational to control the level of assimilation of educational information based on the results of studying a certain volume of educational material. For example, this can be done using the tools of the electronic learning environment LMS Moodle (Terekhina & Chaikina, 2016a, 2016b; Chaikina & Smirnova, 2016; Chaikina et al., 2018). This learning model contributes to the development of students' independence and activity and a deeper assimilation of theoretical information, which is consolidated and implemented in practice in classroom lessons, because mastering new educational material is largely achieved by self-study.

The fundamental idea in this model of blended learning is the restructuring of the organization of educational activities of students, which allows using classroom time for energetic group activities, where students can discuss the content of the topic, solve practice-oriented and creative tasks. The teacher plays the role of a mentor who guides students toward independent research and teamwork during the classroom lesson (Bogoryad & Lysunets, 2014).

The blended learning model "rotation of stations" is a type of group form of training organization, in which a group of students is divided into subgroups. Each subgroup works in a specific area of the classroom (station). The stations differ in the types of educational activities of students and solve certain pedagogical problems (work with a teacher, project work, online task, etc.). This form of class can be implemented in practical and seminar classes with students, including when the teacher needs to check the results of the educational activities of individual students

and he needs time for this during classroom lessons. The implementation of this model requires certain technical equipment: each student must have a communication tool with Internet access, or classes can be conducted in a computer class.

The blended learning model "laboratory rotation" assumes the following organization of educational activities: part of the classroom lessons are organized in the traditional mode, and the other part is conducted online in a computer class. Online classes in a computer class are independent work of students using an electronic learning environment in which control tasks, training exercises, and theoretical material on the topics of the educational program of the discipline being studied are placed. The implementation of this model is possible in classes with students of pedagogical universities in order to:

– carry out control activities using, for example, electronic testing;
– organize creative or research work;
– provide students with opportunities to prepare visual materials for the discipline;
– create conditions for studying additional theoretical material on online platforms;
– organize the active participation of students in collective activities.

The blended learning model "flexible model" is most suitable for use in high school classes as it requires students to have developed skills of self-organization. This model assumes that students will not be limited in time, in one or another type of educational activity, they will be able to independently schedule their work, choose the topic, and pace in which they will study the material, posted mostly in the online environment.

Digital technologies such as podcasts are used to implement blended learning models and, in particular, "flipped classroom" model. Podcasting is the main challenge for educators in blended learning. A podcast is an audio or video file in the form of audio or video information on a specific topic, placed in a digital environment, for example, in an electronic educational environment of an educational organization, on an electronic course of an educational discipline, or on a Google drive. Students can access the podcast via the Internet. Students can download podcasts to their gadgets and listen to them at a convenient time or read the information online.

Podcast recording can be done either by software or hardware. It all depends on the technical capabilities of the author. The process of creating a video or audio podcast is called podcasting.

The teacher can create a podcast to accompany theoretical or practical information on an electronic course or select it on the Internet, for example, use the resource "Khan Academy" (https://ru.khanacademy.org/) or educational materials from the portal "Unified collection of digital educational resources" (http://schoolcollection.edu.ru/). In addition, ready-made electronic educational resources can be found on various video hosting sites. The largest video hosting is "YouTube"—https://www.youtube.com.

The teacher can record a video lecture on his own using a screencast. Currently, there are a large number of programs for creating screencasts, let's list some of them.

- Blue Berry Flash Back—professional screen recording software with powerful editing functions;
- Rylstim—application with the ability to record images from the computer screen. The advantage of the application is the minimalistic interface;
- Screencast-O-Matic—service for video screen capture.

The most affordable option, even for a novice teacher, is an animated presentation created using PowerPoint. The video screen capture service can be used to turn the finished presentation into a video.

42.3 Results

The purpose of the study was theoretical substantiation and experimental verification of the effectiveness of using blended learning models in the process of teaching students of pedagogical university.

The experimental test involved two groups of Minin University students mastering the same educational program in the field of training 44.04.01 Pedagogical education. Master's students were chosen not accidentally for experimental activities. Master's students prefer to receive education combining the learning process with professional activity. After a survey, in which 46 students participated, it was found that 90% of master's students would like to study some disciplines of the educational program and perform practical tasks using information technology and partially remotely. Therefore, the organization of the educational process with master's students based on the use of blended learning models can contribute to an increase in the level of educational achievements of students and the development of their cognitive independence.

Both groups of students participating in the experiment were ranked by the number of participants (by 10 people) and the level of training. One group of students (control) mastered academic disciplines using traditional forms of training organization. The learning activity of the second group of students (experimental) was organized using blended learning models, basically using the "flexible model" and "flipped learning."

To conduct the experiment, electronic courses were developed in three key disciplines (taking into account the profile of training) of the pedagogical master's program based on the electronic learning environment LMS Moodle. All disciplines selected for the experiment were studied over two academic semesters. The structure of e-courses included: theoretical materials, links to video resources, practice-oriented tasks, test materials. The training sessions were conducted both in class and online, using electronic communication platforms.

The ascertaining stage of the experimental work was organized at the end of the first semester, the formative stage was carried out during the second semester. The control stage of the experimental work was completed at the end of the second semester of the master's program.

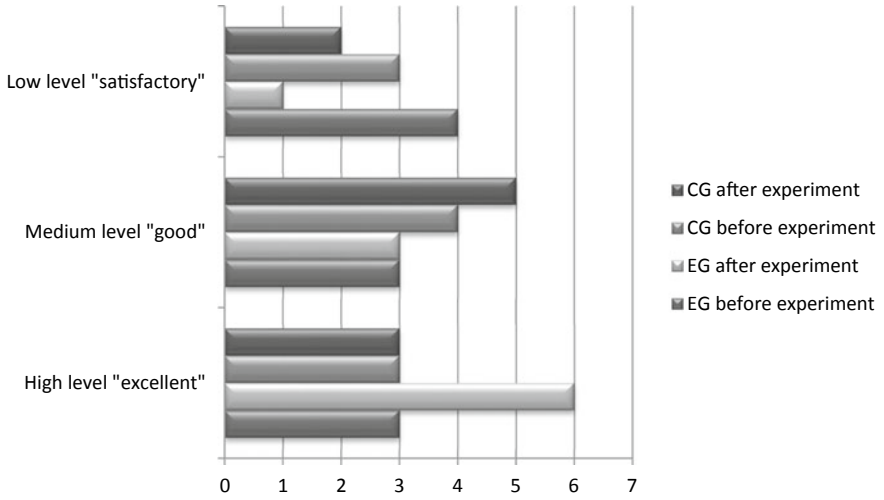

Fig. 42.1 Levels of educational achievements of students in the control and experimental groups before and after the experiment. *Source* Developed and compiled by the authors

Based on the results of the first and second semesters, the success of students' mastering of academic disciplines was analyzed. The data obtained was analyzed and presented in a diagram (Fig. 42.1).

The success of the educational achievements of students was determined based on the analysis of the data of the certification sheets. According to the data obtained, the number of students with a high level of academic achievement in the chosen disciplines increased by 30% and amounted to 60% in the experimental group in the second semester, compared with the first one. In addition, the number of subjects with a low level of educational achievement also decreased by 30% and amounted to 10%.

The results improved slightly in the control group of test persons. Thus, the number of test persons with high level of academic achievement did not change, but the number of test persons with medium level of educational achievement increased by 10% and the number of test persons with low level of educational achievement decreased by 10%

The methodology of Bogoyavlenskaya (Bogoyavlenskaya, 2004) was used to determine the cognitive independence of students. The diagram (Fig. 42.2) shows the results of diagnostics of the level of cognitive independence of test persons in the control and experimental groups.

At the ascertaining stage, most of the students in the experimental group (60%) demonstrated medium level of development of cognitive independence, the smaller part of the group (30%) demonstrated high level of independence, and only 10% of students have low level of independence. After the experiment, the number of students with high level of development of cognitive independence was already 60,

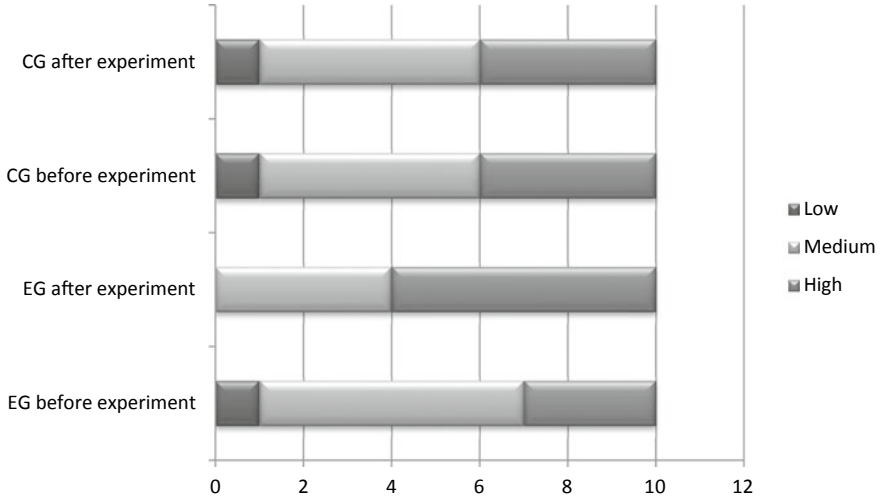

Fig. 42.2 Levels of development of cognitive independence of students in the control and experimental groups before and after the experiment. *Source* Developed and compiled by the authors

40% of students have medium level of development of cognitive independence, no one showed low level.

The results of assessing the level of development of cognitive independence of the control group of test persons at the ascertaining and control stages of the experimental work practically did not change.

42.4 Conclusion

Thus, the study showed that the use of the integration of information and communication and pedagogical technologies within the framework of blended learning in the process of organizing the educational activities of students of pedagogical master's program contributes to an increase in the level of educational achievements and cognitive independence of students. Blended learning activates the cognitive activity of students, which is manifested in the quality of educational results. In the course of the study, it was also found that the electronic learning environment LMS Moodle has sufficient technical capabilities to develop electronic courses for disciplines designed to accompany students, whose educational activities are organized using blended learning models.

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Chapter 43
Commercial Use of Distance Learning Technologies in the Digital Knowledge Economy: Trends and Prospects

Maksim V. Yakovlev, Eduard S. Gareev, and Emil R. Burangulov

JEL Codes I23 · O33

43.1 Introduction

Modern education (especially higher education) is undergoing a rapid digital transformation, aimed not so much at improving its quality, efficiency, and coverage as at increasing its profitability. This development is especially noticeable in the use of e-learning and distance learning technologies. The latter allows exporting educational services to new markets, expanding the range of consumers, reducing operating costs, and generating higher revenues. The trend of entrepreneurial digitalization of education is encouraged by the ideas of "academic capitalism" and the "entrepreneurial university." These concepts stipulate that only economically viable programs and studies should be allowed.

In this regard, identifying and critically analyzing the trends and prospects for commercial use of distance learning technologies becomes especially needed in the context of digitalization and focus on profitability.

M. V. Yakovlev (✉)
Lomonosov Moscow State University, Moscow, Russia

E. S. Gareev · E. R. Burangulov
Ufa State Petroleum Technological University, Ufa, Russia

E. G. Popkova and B. S. Sergi (eds.), *Digital Education in Russia and Central Asia*,
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43.2 Materials and Methods

In this study, we employed theoretical views of W. von Humboldt and R. K. Merton on classical education; the concepts of "academic capitalism," "entrepreneurial university," and "new managerialism"; as well as theses of D. Dickson, M. Castells, B. Readings, and H. Schiller.

The study uses methods of comparative, systemic, neo-institutional, and statistical analysis, methods of expert interviews, questionnaires, and focus groups co-organized by us.

In March 2018, a series of focus groups with 20 experts from the international departments of Russian universities and colleges, ministries, and government agencies were held.

In December 2018, Bashkir State Pedagogical University (BSPU) and Ufa State Petroleum Technological University (USPTU) surveyed international students (220 people) to identify their attitudes and behavioral preferences.

In January 2019, an anonymous expert survey was conducted in nine regions of the Volga Federal District among 34 participants, who answered 22 questions of a standardized questionnaire.

Between September 19 and November 09 of 2020, the Faculty of Philosophy at Moscow State University held a program "Digital Pedagogy of the Modern University" with around 150 professors of Moscow University (including one coauthor of this study), who discussed the problems of using distance learning technologies in modern higher education and suggested ways to solve them.

43.3 Results

The participants of the focus group discussion concluded that the most promising direction in education is the development of online learning (e-learning). They identified the following problems of working with foreign students via distance learning technologies: lack of analytical information about the needs and preferences of students, shortage of training programs in foreign languages, and shortage of teachers who speak foreign languages. The experts proposed the following measures to overcome these obstacles:

- Asking foreign missions and ministries to survey the current needs of potential students in their countries;
- Developing and implementing distance learning programs in major foreign languages with international certification;
- Increasing the number of foreign instructors;
- Actively working with foreign social networks.

They also noted that many Russian students who pay tuition fees are unhappy with the switch to distance learning since universities provided no financial compensation

for it. Since a significant part of the students' expenses (housing and transport) were reduced because of distance learning, many students consider transferring to more prestigious universities in other cities and regions.

The December 2018 survey of international students clarified some of the data and provided additional answers to questions previously discussed in the focus group. About 80% of foreign students of BSPU and USPTU come from Central Asia and speak Russian quite well; no more than 15% of respondents faced a language barrier (many had studied in Russian-language schools). Moreover, most students were familiar with the local cultural code. About half of respondents believe they will acquire the necessary work experience during their studies. About 60% of the students intend to seek employment in Russia, indicating their general satisfaction with existing conditions (relative to their place of origin).

The expert survey complements this data. The experts noted the main obstacles to using distance learning technologies:

- Technological backwardness, inability to create unique new technologies, and innovations on a mass scale—55.1%;
- Government appropriation and bureaucratization of higher education—27.9%;
- Low professionalism of teaching staff, weak personnel potential—13%;
- Insufficient focus on promoting Russian higher education abroad—3%;
- No answer—1%.

The question about the competitive advantages that could ensure the commercial success of Russian distance-learning programs was answered as follows:

- Own traditions and experience in higher education—30%;
- Strong education in natural and technical sciences—27%;
- Long-standing international ties—24%;
- Good training in mass specialties (doctors, engineers, etc.)—18%;
- No answer—1%.

As for the prerequisites to the commercial success of Russian higher education, the experts gave the following reasons:

- Sustainable economic growth and social stability—31%;
- Government support—26%;
- Promotion of Russian higher education programs—24%;
- Autonomy of the higher education system in international cooperation—15%;
- No answer—4%.

Moreover, 92% of respondents agreed that e-learning and online universities could become a major factor in the success of Russian higher education (especially in the natural and technical sciences), given the remaining Soviet experience.

Within the "Digital Pedagogy of the Modern University" program, the participants exchanged ideas and experiences in applying distance learning technologies. Moreover, they estimated and forecasted the commercial use of digital education tools. The discussion touched on the following issues:

- Concentration and keeping the attention of students in an online class;
- Working with multifunctional e-learning platforms (University Without Borders, Moodle, iSpring, WebTutor, Teachbase, GetCourse, Memberlux);
- Online tools (Kahoot, Buncee, Quizizz, Padlet, My simple show, Peardeck, Labster, Istation) and virtual whiteboards (MIRO, Twiddla, Scribblar).
- Setting up an online class, methods of conducting it, etc.

The problem of copyright in the digital environment was also mentioned. One example of potential copyright violation is the unauthorized redistribution of online lecture recordings or their publication under a different name. This problem can be solved by having the original author publish their materials before the online lecture.

43.4 Discussion

We follow W. Humboldt in assuming that "higher scientific institutions are nothing other than the intellectual life of the people whom external leisure or inner desire leads to science and research" (von Humboldt, 2000, pp. 68–83). This quote refers to professors, teachers, researchers, and students who jointly serve the interests of society and science. R. Merton stated that the reason behind this is the principles of universalism, collectivism, selflessness, and organized skepticism (Merton, 1973).

However, entrepreneurial trends have a major effect on the classical image of the university, as reflected in the concept of "academic capitalism." Its developers, S. Slaughter and L. Leslie believe that universities are actively competing organizations that specialize in providing paid educational services, selling research results (licenses, patents), creating small businesses, attracting grants and donations, and concluding trade contracts (Rhoades & Slaughter, 1997; Slaughter & Leslie, 1997). Such structures were called "entrepreneurial universities" by B. Clark. The term denotes a "deliberate creation of an institution involving purposeful work and effort," where the basic principle is "accepting risks in adopting new practices whose outcome is uncertain" (Clark, 2000).

Entrepreneurialization of universities, academic programs, and distance learning technologies determines the transformation of their management structure, which obeys the requirements of financial efficiency and the principles of the "new managerialism." Technocratic managers are becoming more and more influential in the university hierarchy; G. Roggero demonstrates this in the example of Italian universities that are becoming increasingly similar to for-profit corporations (Roggero, 2011).

The ongoing processes shift the focus of education from gradually developing a well-rounded person to rapidly training a skilled worker, as demanded by the digital economy of knowledge.

Educational changes occurring due to digital transformations have two aspects. The negative aspect is noticed by many (Readings, 2010). For example, D. Dickson demonstrated that the focus on profit causes educational institutions to obey major

capital holders to the detriment of social progress and pursuit of knowledge (Dickson, 1984).

M. Castells and H. Schiller noted that entrepreneurialization (along with encroachment on freedoms and privacy) limits access to quality information, increases control and surveillance, and promotes manipulation through the internet (Castells, 2004; Schiller, 1980), resulting in a reduction of public space and accessible and reliable information (Habermas, 2000).

The other aspect is a positive one. O.-H. Ylijoki noted that several universities in Finland productively combine traditional values, socially important practices, and scientific ideas and norms with entrepreneurial orientation (Ylijoki, 2003).

In general, the entrepreneurialization of higher education is inevitable due to the very nature of the capitalist system. Therefore, the main challenge is determining how higher education institutions can use their focus on profit to benefit society and science.

43.5 Conclusion

Currently, the commercial use of distance learning technologies represents a rapidly growing bias of the educational system toward profiting from teaching and research. The development of online platforms and tools leads not so much to broadening the audience concerned with the search for knowledge and public benefit, as more to expanding the pool of consumers of paid products produced by educational corporations. The knowledge economy has become an integral and highly profitable part of a modern capitalist system in the context of digital transformations.

We believe that the increasing commercial use of distance learning technologies should be adjusted so that some of the revenue would be equitably redistributed according to the principle of social responsibility to other areas that are not so easily commercialized (basic research, education of students from low-income families, etc.). For this purpose, the educational community must be more vocal about the classic mission of the university and the importance of a long-term strategy of social development. These two aspects are vital to bringing various intangible assets.

The issue of data encryption is especially important for governments (due to security concerns) and corporations (due to copyright concerns). We believe that these noble pretexts might be used to infringe upon the rights to freedom, privacy, and access to the necessary information for personal, non-commercial use (independent scientific research). However, we by no means wish to encroach on the rights of authorship, only to note that it is currently possible to maintain a reasonable balance between commercial and non-commercial use of research results, avoiding the risk of plagiarism. Creating a free scholarly database with credit to original authorship and using open-source software could greatly help this endeavor.

We believe that the combination of entrepreneurialization and socially responsible use of distance learning technologies may become an effective strategy in the digital economy of knowledge.

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Chapter 44
Paradigmatic Shifts in Education: Causes, Effects, and Risks

Sergey V. Bobryshov, Larisa V. Sumenko, Vladimir S. Toiskin, Olga A. Taran, and Angela V. Babayan

JEL Codes I21 · I25 · J24

44.1 Introduction

The analysis of publications, which are devoted to the understanding of the essence and results of education development, as well as their qualification definition, indicates significant contradictions in the judgments of researchers. From different semantic positions, transformations, which are occurring in education, aren't always classified and described in terms of "paradigm" and "paradigmatic shift." The paradigm is increasingly defined by the characteristics of scientific activity and the parameters of the functioning of science, which aren't addressed to the scientific community, as Kuhn once suggested, but the description of changes in individual elements of social reality concerning some conceptual rules and particular laws. The singled-out features of these changes are often the product of particular worldview, ideological, and cultural attitudes and mental preferences that are possessed by specific "authors" of paradigms. There is also no consistency in the understanding and explanation of the paradigm shift, which is considered as significant changes within the paradigm, as a harbinger and initiator of its change, and as the actual change of one paradigm by another. As the basis that predetermines the paradigm shift in modern education, researchers name the increase in the degree of anthropological orientation

S. V. Bobryshov (✉) · L. V. Sumenko · V. S. Toiskin · O. A. Taran
Stavropol State Pedagogical Institute, Stavropol, Russia

O. A. Taran
e-mail: taran.olya@list.ru

A. V. Babayan
Pyatigorsk State University, Pyatigorsk, Russia

E. G. Popkova and B. S. Sergi (eds.), *Digital Education in Russia and Central Asia*,
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and cultural conformity of education (Alekseenko, 2017); rethinking the principles of equality, dialogism, and mutual support of the world of adults and the world of childhood (Chernikova, 2020); shifting the focus of attention from the objective laws of teaching and upbringing to the subjective values of teachers (Alieva et al., 2011); the emergence of new significantly different pedagogical practices (Rozin, 2007); development in science and education of the idea of global evolutionism (Chernikova, 2020); definition of the idea of ensuring the humanization of the technological sphere as primary for science, society, and education (Shaidenko & Podzolkov, 2014). Other justifications for paradigmatic changes have been put forward in the scientific literature. At the same time, the absence of any consolidated approach to identifying and explaining the foundations of the shift is noticeable.

The growing contradictions on these issues require clarifying the essence of the educational paradigm in the theoretical and practical application contexts of its consideration and finding a common denominator in its structural and compositional construction, determining the foundations and signs of a paradigmatic shift in education.

44.2 Materials and Methods

In the works (Alekseenko, 2017; Alieva et al., 2011; Ganina, 2015; Grof, 1993; Egorova & Lopatukhina, 2017; Chernikova, 2020; Shaidenko & Podzolkov, 2014), the application of the paradigm approach to substantiating the systemic foundations of the development of modern education is considered from various theoretical and methodological positions. Researchers distinguish two paradigmatic platforms of vision of the process of transformation of education—scientific and practical, which predetermined the variety of designation and description of the paradigmatic shift in education in terms of determining its essence, content, and forms of manifestation. However, despite the significant study of the problem at the theoretical level, it hasn't been sufficiently studied empirically.

The study was carried out based on the principles of consistency, determinism, the unity of historical and logical, and holistic study of phenomena and processes in their development, based on paradigmatic, axiological, cultural, subject-activity approaches, revealing the essence of education as a social process, social institution, and area of pedagogical activity.

The study of the transformation of the value and worldview base of educational subjects as one of the determinants of the paradigmatic shift was carried out based on questionnaires and the focus group method, in which active teachers with various work experience (232 people), students of a pedagogical institute, high school students of Stavropol schools (2,058 people), and also their parents (93 people) took part.

44.3 Results

Let us fix the understanding of the paradigmalization of education: if it says about education as an area of functioning of pedagogical science (theory of education, theory of instruction), it should be about the pedagogical paradigm and, accordingly, about the paradigmatic shift in education as a reflection of the development of pedagogical science (the emergence of theories and concepts of a new level); if education is analyzed from the standpoint of educational practice (education as a social institution and an educational process), then it is appropriate to talk about the educational paradigm and paradigm shift in education as a characteristic of different depth and volume of changes in this practice. Shifts in pedagogical and educational paradigms can coincide, interdetermining and forming a single process, or they can be realized in the same or parallel planes simultaneously and practically without affecting each other.

In general, it should be noted that the development of the institution of education is carried out as a response to the radically changing conditions of personal life and aggravating contradictions in culture, as a result of social, scientific, technical, informational, political, and economic development of states and societies (Chernikova, 2020; Shaidenko & Podzolkov, 2014). Reflection of each more or less significant step on the path of this development is marked by the emergence, or even the proclamation of new educational paradigms (there are more than thirty of them), with the help of which scientists are trying to constitute new pedagogical practices of teaching, upbringing, the organization of pedagogical interaction, etc. (Egorova & Lopatukhina, 2017). Some of the latest are the paradigms of e-learning, digital pedagogy, smart education, and technological knowledge. The rationale, meanings, and functional purpose of such paradigms change depending on the personal attitudes of scientists, and contexts of practice-oriented consideration of the realities of education.

An analysis of the development of pedagogical science shows that a change in pedagogical paradigms has to wait for decades or even centuries. But this happens only in such conditions when it comes to pedagogical science. In order to clarify the nature and characteristics of this phenomenon concerning education, let us consider how the paradigm of education is manifested, what the basic reasons and tasks of its paradigmatic redesign are, and what effects and risks generate paradigmatic shifts.

What is the difference between paradigms in the sphere of social reality, to which education belongs? What is the difference between the same paradigm in its two qualitative states—before and after the paradigm shift? The authors define the assemblage points of the paradigm, i.e., its key nodes, some paradigmatic niches that determine it certain editions, to do this.

In interpreting the paradigm in this analysis, the authors follow Grof, who pointed out that "in a broad sense, a paradigm can be defined as a set of beliefs, values, and techniques shared by members of a given scientific community. Some of the paradigms are philosophical, they are general and all-embracing; other paradigms guide scientific thinking in rather specific, limited areas of knowledge" (Grof, 1993). According to this approach, the paradigm is perceived as a set of ideas, a complex of

worldviews and value attitudes that dictate the way of being of subjects of the pedagogical process, as a methodological approach to the design, organization, assessment of educational systems, and also as a basic model or strategy for the development of training and education, etc.

Thus, while defining the paradigm as a whole or its separate edition in some phase of transformation, let us pay attention, first of all, to the characteristics of the subjective and objective in professional-pedagogical and everyday consciousness (knowledge, perceptions, ideas, opinions, judgments, and value orientations) of the subjects of educational life and to their attitude to educational activity in terms of perceiving its essence and mission, achieving the set goals and its object (value, motivational, emotional, and volitional parameters of their personal and professional beliefs, as well as upbringing in the area of education and training), and on the pedagogical techniques and technologies implemented in connection with this attitude. Based on this approach, we carry out breeding according to paradigmatic niches:

(a) A professional-pedagogical conceptual, and in general, a cognitive base (ideas, concepts, and theories) that is specific of individual paradigmatic links in the structure of the historical path of development of education and pedagogy;
(b) Professional-pedagogical value-worldview base of teachers representing certain paradigmatic links (characteristics of professional consciousness, approaches to goal-setting, prevailing motivational-value orientations and attitudes towards person and pupils as subjects of the educational process, which also affect education and training as processes, and phenomena, on the nature of relations, and interactions between the teacher and the student, etc.);
(c) Professional and pedagogical technological base (the prevailing technological toolkit of the educational process and education in general as a social institution).

Any time of the development of society, this paradigmatic niche in the educational process can act as a dominant, building up the entire process for itself. The analysis of the historical and pedagogical process shows that previously, for a very long time, such a parameter of education as its value-semantic basis was resistant to any social transformations: understanding the value of education and knowledge in the life of a person and society, the value of the school and the role of the teacher, and the value of mutually supportive, complementary, and mutually responsible cooperation between the school and the family in solving the problems of teaching and upbringing of children. The technological component of education acted as a pronounced (dominant) paradigmatic niche, subject to most of the influences of changes in connection with the development of society. These are the shifts in pedagogical techniques, methodologies, and technologies that have been most characteristic of the changing educational paradigms over the past several centuries.

Today, there is no pronounced dominant; shifts are recorded in all paradigmatic niches, with the dominance of changes in the value, and worldview base of the main subjects of education. This study of the transformation of judgments in terms of concepts that are crucial for value self-determination made it possible to fix the moment when this manifests itself.

Judgments about teacher. Teachers with 30–35 years of experience indicated that teachers were the main and most authoritative person for children and parents in matters of education and life previously (76% of the respondents). Students and their parents were characterized by the desire to trust the teacher, and also to perceive him as a standard. The highest measure of pedagogical success was "the desire of students to achieve the educational and moral heights of a teacher," and even to surpass him (noted by 61% of the respondents). Today the situation is different. Young teachers, parents (up to 35 years old), and students see the teacher primarily responsible for the implementation of educational services and preparation of students for exams (89% of the respondents in this group). The school teacher is far from being "an authority" for students (68%). They don't strive and don't think that it's necessary to "reach out," and repeat the teacher in themselves (81%); perceive him as a "social loser," who is incapable of a meaningful career (72%). Parents and teachers are mutually dissatisfied with each other, as well as their positions, the content, and the form of pedagogical requirements (100% of the respondents, including teachers with long-time experience). Parents have no wish to be guided by the teacher's opinion on education issues (96% of the respondents of all age groups).

Learning judgments. Representatives of teachers of the older age group noted that "in the past" studying by teachers, students, and parents was consistently perceived at any academic performance as "responsible hard work requiring constancy and diligence" (96%). The effectiveness of the studying was the subject of attention and care of everyone—the teaching staff, family, friends, leaders of sections, public associations, and organizations (88%), in this way, a successful student was honored (100%). Currently, judgments about the essence, purpose, and motives of learning have changed. Students and young teachers note that while maintaining outwardly expressed characteristics, studying for many students is just an imitation of learning activity. Studying well, badly, or not studying at all is "everyone's private matter and responsibility" (98%), and no one has to interfere with them (80%).

Judgments about education. According to the opinions of teachers with extensive work experience, education was previously considered as a "common good", and "a prerequisite for success in profession and life" (82%), as "the basis and main resource of academic mobility" (67%), and also ensuring professional literacy and all-round personal development (76%). At present, education, according to the answers of teachers of all age groups and students, is practically understood as an "obligatory element of life formation" that doesn't directly determine the choice of a profession and success (96%). This, as it was before, is an important resource of mobility, but mainly social (82%), and it also acts as a "prop," "toolkit" for career and status advancement (81% of students, 62% of experienced teachers, 68% of young teachers, and 78% of parents). Education isn't perceived by students as "a significant work of their lives" (98%). This is because the target guidelines for education are not clearly formulated by the state, and they are also perceived by the subjects of education in the form of an "ideological flare."

Family judgments. In the opinion of the respondents of the older age group, family, as a subject of education, was previously the "first helper of the school," and "responsible for the results of education" (96%). Today, education and upbringing are "unfortunately, the case of professionals and the area of responsibility of the school.". The school is "responsible" for the educational success of the children, and if it fails, the family can hire a tutor (100% of responses in all age groups). All the respondents show that in the senior classes the family mostly doesn't trust the school, because of the quality of education. Tutoring is parallel to the school reality of modern education.

Judgments about educational organizations. Teachers with large experience claim that the school, since the beginning of their labor activity, has been "the main resource of education and upbringing". It ensured the all-around development of the student's personality, preparation for work, and life (76%), was a "second home," "a place of growing up, gaining experience of creativity, friendship, mutual assistance" (82%). Modern schools, colleges, and universities, in their opinion, neutralize their responsibility for the level of education of students, focus on average indicators, and the average contingent, on reporting, and formalized indicators (82%). Young teachers share this opinion (88%), and young parents don't expect anything else from the school for their children, except only teaching (91%). So, a decrease in the status of an educational organization in public perception is recorded.

Judgments about education and knowledge. Education, according to the answers of older teachers, was previously determined by the aspiration to achieve "a well-educated person" (76%). For this purpose, the cells of the student's education matrix were filled with a variety of knowledge, which was considered as "the basis for mastering the types and methods of activity" (82%), and as "building material for personal development" (82%). It was worthy to be literate, erudite, and knowledgeable in personal self-manifestation, as well as external self-presentation, work, and communication (92%). Humanitarian knowledge was the "first and main sign of broad education"; in education, a certain redundancy of knowledge should be achieved, because they are "baggage for life" (76%). Now, education and knowledge are mainly identified with functional literacy (68%). According to the opinion of students (71%) and young teachers (81%), a graduate comes to production with individual attitudes, with an understanding of "what and how to do," and denies the importance of most of the previous education. In the process of education, all students are doubted and criticized by almost all of their components (76%). Students, just starting to learn, not quite consciously, have been already given themselves the following rule: "forget what the school and the university teach" (88%), this is "not relevant, it will not be useful, it's only needed for reporting" (82%). Young teachers (76%), parents (82%), and students (88%) assess knowledge mainly from a pragmatic standpoint ("what will be the benefit from this; what will this knowledge give in a tangible sense"). Thus, knowledge loses its meaning as a civilizational concept and is replaced by the format of utilitarian competence. At the same time, knowledge, being significant only in the applied aspect, is "collapsed," simplified, all "excess" and "unnecessary" is cut-off, if it doesn't carry a functional ("acquisition") load. The humanitarian component of knowledge (literature, history, art, etc.) is difficult to

monetize, therefore, for persons younger than 30 (88%), it's considered as optional knowledge, and also as "excess."

The conducted research demonstrates that the semantic content of the value-worldview base of teachers has changed significantly. It has become different in many components and teaching activities. But this is revealed and comes out only at a certain level of penetration into the individual semantic areas of representatives of the teaching community. In the mass "ceremonial" pedagogical consciousness, the new ideological pedagogical reality doesn't manifest as such, still having a stable "old" value color. Due to the blurred perception of the understanding of new values by teachers, they don't have significance that gives the meanings of education and pedagogical activity; value shifts haven't been reflected at the systemic level yet. They are hardly correlated with the new institutional framework of education, and the cultural conditions of society, and they are not accepted by the pedagogical corps as fait accompli (Ogorodnikov & Ogorodnikov, 2019).

How are the results of the observed paradigmatic shift reflected in pedagogical research today? For example, in one of the studies (Alieva et al., 2011), a new understanding of the essence of mechanisms, laws, content, and methods of upbringing is presented as a methodological manifestation of a paradigmatic shift in the theory of upbringing: an appeal to a person, and not to his projections; emphasis on the development of the "self" of the child's personality, the education of identity (gender, social, cultural, etc.); reliance on the ideas of pedagogical support and support of the child, poly-subject upbringing; the growing role of "understanding" methods; an increase in the number of culturally related concepts and models of upbringing; studying the influence of language practices and schemes on education; the use of new approaches in education (positional, event, synergetic, hermeneutic, acmeological), concepts and models of non-classical and post-non-classical science (general theory of systems, synergetics, etc.) (Alieva et al., 2011).

It's not hard to see that some of the above-mentioned innovations, which have been actively implemented in the practice of education for several decades, are considered by scientists as the result of a paradigmatic shift. The next questions arise from this: when did this paradigm shift begin and in connection with what? How long will it last? Will it ever end? Indeed, in fact, in the above list of its consequences, the progressive steps of the development of pedagogical science and educational practice are alternately reflected. But this brings us back to the issue of clarity in understanding and differentiating the educational and pedagogical paradigm, understanding the effects and results of the paradigm shift in education and pedagogy again.

44.4 Conclusion

The paradigm shift in education, which is seen today, is not unique. An analysis of the experience of experiencing paradigmatic shifts in education in the first quarter of the twentieth century and at the turn of the twentieth–twenty-first centuries shows the similarity of their manifestation and driving mechanisms. Both then and now,

the interrelation of crisis processes in society and education is being fixed; criticism and denial of preexisting goals, content, and technological structures of training and education; extrapolation into the formation of new social relations with giving them system-forming functions; mass experimentation and development of alternative education models based on different, sometimes mutually exclusive value systems; approval of the variety of forms of functioning and provision of the institution of education; idealization of the natural forces and potential of the trainee while neglecting them in real practice, etc. So, a paradigm shift isn't just a modernization of the educational paradigm due to a change in dominants in the structure of its "body," but a pronounced and cardinal change in the functional state of education in causal correlation with significant changes in the state of society.

In general, the effects arising in the course of the paradigmatic shift allow education to act as a significant factor ensuring the stability of transformation processes, the formation of an ideological, and value consensus in society, as well as the professional-pedagogical community. But the shift may not be recognized in the cause-and-effect plan in the absence of proper scientific reflection, the changes that have occurred aren't understood as a new reality and aren't accepted by individual groups of teachers, the consequences of their further influence on educational policy, practice, and science are not taken into account. Thus, there are risks within each shift. The most obvious ones are:

– at the same time of the shift, it's difficult to unequivocally differentiate its constructive and destructive manifestations and prospects; the productivity of the teaching and upbringing processes can't be guaranteed due to the non-obviousness of the pedagogical solutions proposed within the framework of innovations;
– innovations, which are produced within the framework of the shift, might be unrealized because new ideas and practices built on their basis don't always succeed in demonstrating their potential, showing their advantages, and progressiveness. The effects don't appear immediately, the increase in positivity is visible over time. And the time gap can be large—within its framework, innovations can be forgotten;
– it is possible to interchange the phenomena "pedagogical event/phenomenon" and "pedagogical regularity." The shift appears dotty, especially in the first phase. Some striking effects, which were obtained in the short-term dimension, can be perceived as unequivocally positive and constructive (for example, "digital education," during the lockdown period), and this prompts them to be recognized as "confirmed," and extrapolated to widespread practice. But in the medium-term and long-term, these effects can show significant disadvantages and omissions;
– the processes and effects caused by the shift are sometimes excessively idealized, and the results, which act as progressive innovations, are simplified "for clarity" and formalized for forcible implementation into wide practice "above." This causes their rejection by teachers.

Considering all the text above, it is quite obvious that the educational systems of Russia and other countries, which are in a shift, have already entered the risk zone.

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Chapter 45
The Mechanism for the Implementation of Innovative Activities in Additional Educational Institutions

Olga V. Golubeva, Tatiana E. Lebedeva, Marina L. Gruzdeva, Zhanna V. Chaykina, and Mariia V. Mukhina

JEL Code I 20

45.1 Introduction

Currently, the personal educational potential, as well as the educational potential of social institutions, are becoming more and more relevant in society. Such a concept as "lifelong education" is used in scientific literature more and more often. Non-standard education, specifically additional education, expands the educational space of standard education and increases the productivity and the level of use of various innovations, methods, technologies in teaching. Today, a large number of organizations of additional education are beginning to use new innovative elements in their activities more and more often. However, the contradiction between the need for innovative development and the incompetence of the employees of these organizations (managers, methodologists, teachers) in their practical implementation arose in the process of introducing innovations in educational organizations.

Innovation activity is a powerful factor in the development of additional education organizations aimed at obtaining new knowledge and a qualitatively different pedagogical practice. The modern stage of education development is characterized by innovative processes in it. This changes the educational paradigm and is reflected in a variety of approaches, a variety of content, changes in mentality, behavior, and attitudes (Gruzdeva & Tukenova, 2019; Sautina, 2017).

Innovations have also reached additional education as a structure of education in general. It is possible to develop potential abilities and subjective competencies, to learn to adapt to modern society, and create own time in the context of additional

O. V. Golubeva (✉) · T. E. Lebedeva · M. L. Gruzdeva · Z. V. Chaykina · M. V. Mukhina
Minin Nizhny Novgorod State Pedagogical University, Nizhny Novgorod, Russia

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education. The main line of improving the structure of additional education is innovative activity, as the main quality of an educational organization and a criterion for the effectiveness of its work. Specifically, the place of the teacher as a direct participant in all changes in the context of the innovative development strategy of the educational organization is growing.

45.2 Methodology

Initially, innovations were reflected in scientific publications in the framework of economic research. Currently, the introduction of innovations and scientific research to assess innovative changes are carried out in other spheres of society, including education.

Fundamental theoretical and methodological studies of the problem of innovative activity in educational organizations from the standpoint of the system-activity approach are reflected in the works of V. A. Gorsky, V. I. Zagvyazinsky, L. I. Lazareva, P. S. Lerner, S. V. Naumova, M. M. Potashnik, N. B. Pugacheva, M. V. Ryzhakova, D. V. Smirnova, A. V. Khutorsky, etc. (Osmolovskaya, 2013; Potashnik & Levit, 2016; Smirnov, 2012).

Today, in the third decade of the twenty-first century, innovative search has become a part of the activities of many educational organizations of additional education. The research results of E. A. Babiy, E. O. Golovina, A. G. Gosteva, O. G. Grokholskaya, Z. I. Guboglo, E. M. Mikhailova, N. A. Petrovskaya, N. N. Sabina, E. A. Sivitskaya, Yu. V. Sharonin, and a number of other scientists show that there are a lot of innovations that play a big role in the development of the system of additional education (Babiy, 2010; Bobrysheva, 2017; Korznikova, 2017; Kozyreva, 2021).

45.3 Results

The innovative activity and innovative practice of the teacher of additional education is an obligatory element of the personality-pedagogical structure and takes a selective research type. This presupposes the comprehension and change of the personnel activity of pedagogical workers in the system of additional education (Loginova & Novoselov, 2019; Smirnov, 2012).

Let's highlight a number of projection reasons for innovations in the field of additional education (Fig. 45.1).

The Federal Law "On Education in the Russian Federation" states that innovative activity "is aimed at improving the scientific and pedagogical, educational and methodological, organizational and legal, financial and economic, personnel, material and technical support of the education system" (Law of the Russian Federation of December 29, No. 273-FZ "On education in the Russian Federation" 2012).

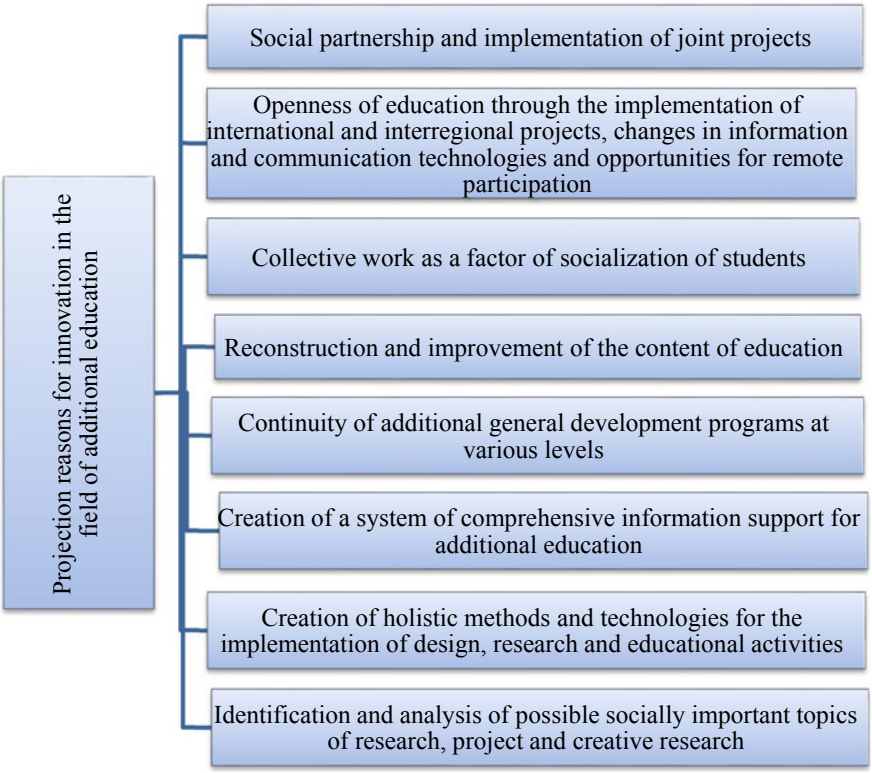

Fig. 45.1 Projection reasons for innovations in the field of additional education. *Source* Compiled by the authors

The legislation of the Russian Federation establishes that innovative activities in the education system are implemented in two main formats: promoting innovation projects and introducing innovative programs.

Thus, innovative activity is associated with the idea of developing the organization of additional education and is a systemically regulated and controlled process, and its direction is determined by the state policy in the field of education.

We will highlight the priority areas of innovation in education in accordance with the State Program of the Russian Federation "Development of Education for 2013–2020" (Fig. 45.2).

Let's consider these areas in more detail. The formation of a lifelong education system presupposes the development of human resources in accordance with the socioeconomic development of the Russian Federation. The development of organizational and economic mechanisms for the implementation of innovative activities and infrastructure involves ensuring equal access to the services of preschool, general and additional education, as well as the modernization of educational programs aimed at achieving the modern quality of educational results and socialization results. This,

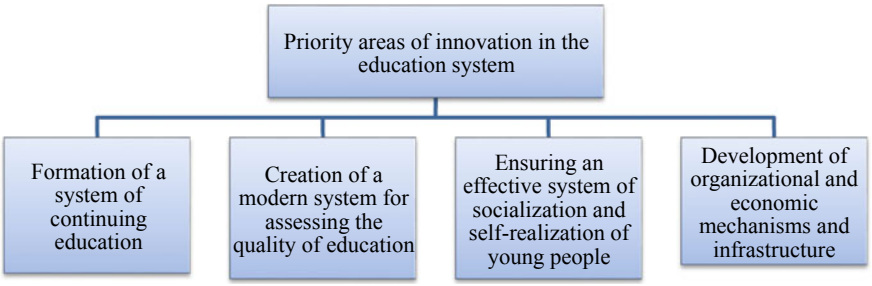

Fig. 45.2 Priority areas of innovation in the education system. *Source* Compiled by the authors

in turn, leads to "the creation of a modern system for assessing the quality of education, and contributes to the socialization and self-realization of young people, the development of their potential" (Andrienko, 2011).

The following trends of innovation activity are defined as the leading ones: dissemination, creation of structural technological innovations; development of modern mechanisms and technologies; implementation of measures for the development of the scientific, educational, and creative environment in educational organizations; development of an effective system of additional education; formation of a popular system for assessing the quality of education and educational results. Educational organizations of all types and types with different thematic priorities can be included in innovative activities.

Thus, innovative activity in the system of additional education is focused on improving educational practice and developing educational organizations based on innovations. Innovative activity is designed to provide a new quality of the system of additional education and create conditions for its development.

Considering the main mechanisms and directions of innovation, let's note:

- improving the content of education;
- introduction and study of the practice of today's technologies of pedagogy;
- design of a system of activities with talented children;
- modernization of the management system;
- informatization of the education process.

The innovative practice of a teacher of additional education turns out to be an obligatory element of the personality-pedagogical structure and takes on a selective research type. This presupposes a reassessment of personnel activities for teaching staff, going beyond the established performing function and replacing it with a problem-search, reflexive-analytical one that meets the needs of society and organizes conditions in order to improve the personality (Solomatin, 2014; Tyunnikov, 2019). The interest in new teaching changes and knowledge, in social and educational pedagogical functions is increasing in the team of teachers. The main postulates of the innovative activity of additional education are the behavior and potential of the teacher, his sensitivity to modern reality and openness. The inclusion of a teacher in

innovative work affects an increase in the degree of his professional literacy, activates his interest in obtaining the latest knowledge, improving certification, developing creative potential, self-realization in solving pedagogical problems, self-expression, and as a conclusion, stimulating students' interest in attending classes. This is very important in the system of additional education.

Innovative activity is focused on the development, implementation into practice, and approbation of the activities of the structures of modern technologies of pedagogy, aimed at effectively solving the priority tasks faced by the teaching staff. Modern additional education needs a teacher of innovative thinking, a teacher-researcher, and a teacher-consultant. It should be a teacher who has the competence to carry out creative professional activities, who is ready for constant self-development.

The innovative activity of the educational organization of additional education contributes to the disclosure of the potential of the teacher and the abilities of students, the creative orientation of the educational process, its humanization, and personal orientation toward self-development and self-education of the individual.

The main directions of innovative activity in the additional education of children are the innovative content of education; modern pedagogical technologies; work with gifted children; modern methods, forms, and means of teaching; modern control system; computerization and informatization of the educational process (Smirnova et al., 2021). The teacher's attention shifts to the child, which means that the central figure in the educational process is not the teacher, but the child in innovative activities. The function of the teacher is to support children in their activities, to promote their successful development in the world, to help in solving the problems that have arisen, to help to own various information (Khodyreva, 2016). Thus, the leading prerequisites for innovative activity in educational institutions of additional education are the teacher's potential, his sensitivity and openness to the new.

The technological nature of the educational process becomes a key characteristic of the activities of the teacher of additional education and marks the transition to the next stage of the organization of the educational process.

Changing the content, implementation methods, and forms of additional education is possible, including through the use of modern technologies by the teacher, which is aimed at the development of students, taking into account their creative talents.

It is necessary to adhere to a certain algorithm when describing pedagogical technologies. It is necessary to start with the development and substantiation of the author's concept and the leading idea of the activity. Next, it is necessary to identify what needs to be changed, what needs to be introduced, and what needs to be eliminated, that is, to think about how the didactic process can be updated. The next stage will be the development of a project of activities, that is, a program, which will describe the time, conditions, and stages of implementation. Next, it is necessary to find out what will be included in the information and didactic support of the project. It is impossible to do without the innovative component of teaching methods; it is necessary to think over what new techniques, methods, or inventions the teacher will use in his program. Ensuring a favorable emotional and psychological climate in the team will also be one of the important aspects of the development

of pedagogical technologies. And the final stage will be the creation of a conceptual model of pedagogical technology. It should also be noted that the innovative (research) thinking of the teacher is necessary for the creation and implementation of technologies according to a given algorithm.

The use of various innovative technologies makes it possible to develop the cognitive abilities of children, the ability to navigate in the information space, as well as their predictive thinking, the ability to apply the knowledge gained to solve cognitive and practical problems. The competence of the teacher of additional education indicates a high level of personal development, the ability for introspection and self-development, readiness, and ability to assess the quality of their work. The discovery and development of innovations that contribute to the emergence of qualitative changes in the activities of an educational organization are the key mechanisms for the optimal growth of the system in the additional education of children (Chaykina et al., 2021).

According to M. A. Semina, indicators of innovative technologies are: the achievement of a high result by each student; effective assimilation of a large amount of material without effort; learning in an atmosphere of cooperation and a positive microclimate; motivation to learn (Semina, 2018).

The activities of any specialist, as a rule, include a range of tasks to be solved, which is subdivided into four main groups:

Group 1. Special or professional tasks.
Group 2. Organizational tasks.
Group 3. Teaching and educational tasks.
Group 4. Tasks to improve the professional training of teaching staff.

The forms of the results of the teacher's innovative activity are presented in Fig. 45.3.

Thus, there is a need to create innovative educational programs, to develop a new consistent support in the structure of additional education. Programs must be multifunctional, flexible, and loyal to children with different abilities, allowing the teacher to make adjustments to the course of the educational process.

Summing up, we can conclude that innovative technologies in the system of additional education of children contribute to the disclosure of the potential of the

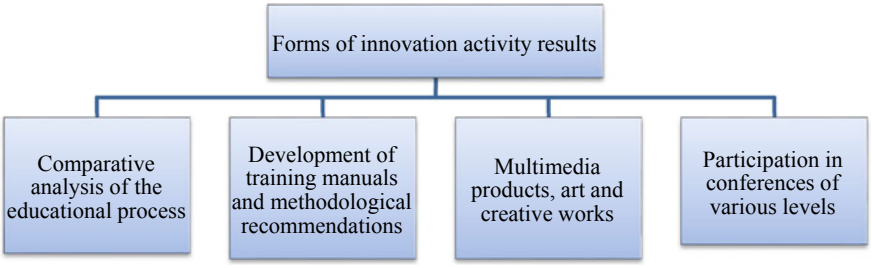

Fig. 45.3 Forms of results of innovation. *Source* Compiled by the authors

teacher and the abilities of students, to the creative orientation of the educational process, its humanization, and personal orientation toward self-development and self-education of the individual.

45.4 Conclusion

Everything that has been mentioned allows us to conclude that the main ideas that determine the development of the educational organization of additional education can be:

1. The idea of ensuring equal opportunities and receiving additional education services at the expense of the budget.
2. The idea of creating variability and a wide range of educational services for additional education.
3. The idea of additional education as an educational trajectory, which allows everyone to build one's own strategy of self-realization in modern conditions.
4. The idea of preserving a single continuous educational space.
5. The idea of ensuring the development of additional education through innovative revision of the content, its organizational forms, and technologies.

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Chapter 46
Game Teaching Methods as a Means of Integration in Educational Activities

Zhanna V. Smirnova, Zhanna V. Chaykina, Lyubov I. Kutepova, Natalia S. Andryashina, and Olga M. Smetanina

JEL Codes R12 · Q13

46.1 Introduction

The main task of the student's cognitive activity is the formation of the need and ability to actively think and overcome difficulties in the learning process. One of the main factors in the Concept of Education is the intellectual and creative knowledge of students by increasing their cognitive activity (Burkhanova et al., 2020).

The formation of integration in educational activities is a problem that has arisen long ago and is one of the most urgent in education to this day. Therefore, the main task of the teacher is the search for the most effective, innovative forms, methods, conditions, and techniques of teaching, the purpose of which is to integrate the cognitive activity of students in the learning process.

The study of the process of using game teaching methods requires substantiation of the positive impact of enhancing the cognitive activity of students.

Z. V. Smirnova (✉) · Z. V. Chaykina · L. I. Kutepova · N. S. Andryashina
Minin Nizhny Novgorod State Pedagogical University, Nizhny Novgorod, Russia
e-mail: z.v.smirnova@mininuniver.ru

N. S. Andryashina
e-mail: natali_andr@bk.ru

O. M. Smetanina
Nizhny Novgorod Institute of Management, Branch of the Russian Presidential Academy of National Economy and Public Administration, Nizhny Novgorod, Russia
e-mail: smetanina-om@ranepa.ru

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46.2 Methodology

A person is required not only to possess some knowledge and skills, but also to be able to independently obtain this knowledge, correctly operate with facts, and think creatively in the modern era of informatization and computerization, as well as in the context of rapidly changing trends.

Approaches to teaching schoolchildren are changing in connection with modernization of education in Russia, great emphasis is placed on the development not only of the development of skills and abilities by the student, but on the study of methods of cognitive activity. Such teachers as V.A. Belikov, N.F. Talyzina, A.V. Usova, and many other teachers talked about the importance of mastering the methods of cognitive activity. V.A. Sukhomlinsky believed that one cannot simply present ready-made information to students, because he is forced to swallow unchewed pieces of information, and the student feels unwell at first with this method of cognition, and then gets sick.

Methods of expert assessments, comparative analysis, statistical comparison, and research theory are the methodological basis of the research.

The purpose of this research was to study the cognitive activity of schoolchildren in the Technology class at school. Initial and follow-up testing in two classes was performed for this diagnosis. The motivation factor for successful studies is stronger than the IQ factor. Awareness of the high importance of the motive for learning for a successful study led to the allocation of the principle of motivational support of the educational process (Garina et al., 2020).

The questionnaire for studying the level of cognitive activity, developed at the Kharkiv Scientific and Methodological Pedagogical Center of Education Management by psychologist B.K. Pashnev, was used to diagnose the cognitive activity of students (Gruzdeva et al., 2019).

The questions for the questionnaire are selected in such a way that they reflect three aspects of cognitive activity: cognitive interest, mental activity, and volitional effort. This technique allows to determine the level of cognitive activity of the student and compare it with the normative indicators for different age groups (obtained as a result of standardization of the questionnaire by its developers).

The questionnaire consists of two groups of questions:

- 42 questions aimed at studying cognitive activity;
- 10 questions, with the help of which the indicator of insincerity or social desirability of the answer is investigated. Individual answer options are compared with the key. 1 point is calculated for each match of the answer with the key. The total amount of points received is compared with the existing norms for the respective age groups.

The study of the motives of educational activity was carried out using a questionnaire.

The questionnaire used allows to reveal the student's attitude to the eight main motives of educational activity by the method of paired elections. The questionnaire

consists of 28 items, each of which includes a pair of statements reflecting two of the eight motives for learning activities (Lvov et al., 2019). The experiment consists of three stages.

46.3 Results

An experimental study of the development of the integration of the cognitive activity of students in Technology lessons was carried out on the basis of school No. 15 in Nizhny Novgorod. The purpose of this practical study is to develop and justify the feasibility of conducting lessons using didactic games (Myalkina et al., 2018).

Diagnostics are carried out according to the methodology of the psychologist B.K. Pashnev. The purpose of this diagnosis is to study the cognitive activity of students.

We have identified two groups of subjects in the framework of this study:

Group 1—control—consists of students of 5 "A" class in the amount of 15 people.

Group 2—experimental—consists of students of middle school age of 5 "B" class in the amount of 18 people.

All students are at the same level in the curriculum. The experimental group will be given lessons in one section by conducting didactic games, the control group will be provided with them in the usual, frontal way. Another test to determine the cognitive activity of the control and experimental groups will be carried out at the end of the section (Rudenko et al., 2021).

The study was carried out according to the methodology of the psychologist B.K. Pashnev, the purpose of which is to study the cognitive activity of students in the control and experimental groups before the start of the experiment. The survey was carried out anonymously in order to obtain the most reliable result. We can say that the average score is 29, according to the survey. 29 is the average result of class cognitive activity. Four questionnaires that have 7 or more answers with the key of the "insincerity scale" can be seen in the experimental group, excluding the questionnaires that are invalid, we can say that the average score is 28. 28 is the average result of class cognitive activity (Sedykh, 2019).

After conducting a set of developed lessons, which were aimed at enhancing the cognitive activity of schoolchildren by introducing game teaching methods into the school process of the experimental group, the students were tested again using the same methodology (Smirnova et al., 2020).

After conducting a set of developed lessons, which were aimed at enhancing the cognitive activity of schoolchildren by introducing game teaching methods into the school process of the experimental group, the students were tested again using the same methodology.

Thus, we can say that the average score is 30, excluding questionnaires that are invalid. 30 is the average result of class cognitive activity. Three questionnaires that have 7 or more answers with the key of the "insincerity scale" can be seen in the experimental group, the research results are considered invalid for students in the age range of 11–12 years. Thus, we can say that the average score is 33, excluding

the questionnaires that are invalid. 33 is the average result of the class's cognitive activity, but only two points to 35 points were not enough to reveal high cognitive activity in students.

Figure 46.1 clearly shows the cognitive activity of students in the control and experimental groups before the start of the experiment.

15% of students have a high level of cognitive activity (more than 35 points), 78% of students have an intermediate level of cognitive activity, and 7% of students have a low level of cognitive activity (less than 20 points) in the control group.

Thus, 6% of students had a high level of cognitive activity (more than 35 points), 81% of students had an average level of cognitive activity, and 13% of students had a low level of cognitive activity (less than 20 points) in the experimental group.

The data in both classes changed after the experiment, in the control class it is insignificant, and the increase in cognitive activity in the experimental one can be seen in Fig. 46.2.

Thus, 23% of students had a high level of cognitive activity (more than 35 points), 70% of students had an intermediate level of cognitive activity, and 7% of students had a low level of cognitive activity (less than 20 points) in the control group at the end of the experiment.

31% of students have a high level of cognitive activity (more than 35 points), 69% of students have an intermediate level of cognitive activity, and a low level of cognitive activity (less than 20 points) was not detected in the experimental group.

As a result of the experiment, we can conclude that the cognitive activity of students is increased by using non-standard teaching methods, namely, game technologies, which can be seen in Fig. 46.3.

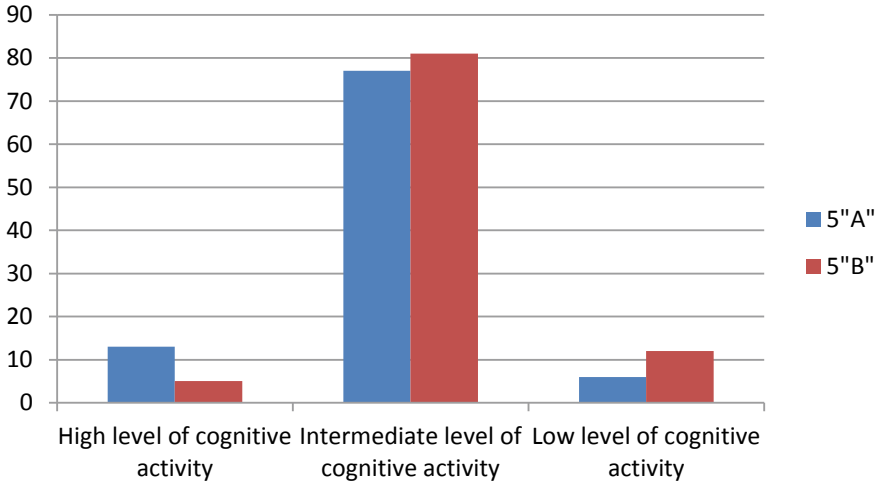

Fig. 46.1 The results of the study of the cognitive activity of students before the start of the experiment. *Source* Developed and compiled by the authors

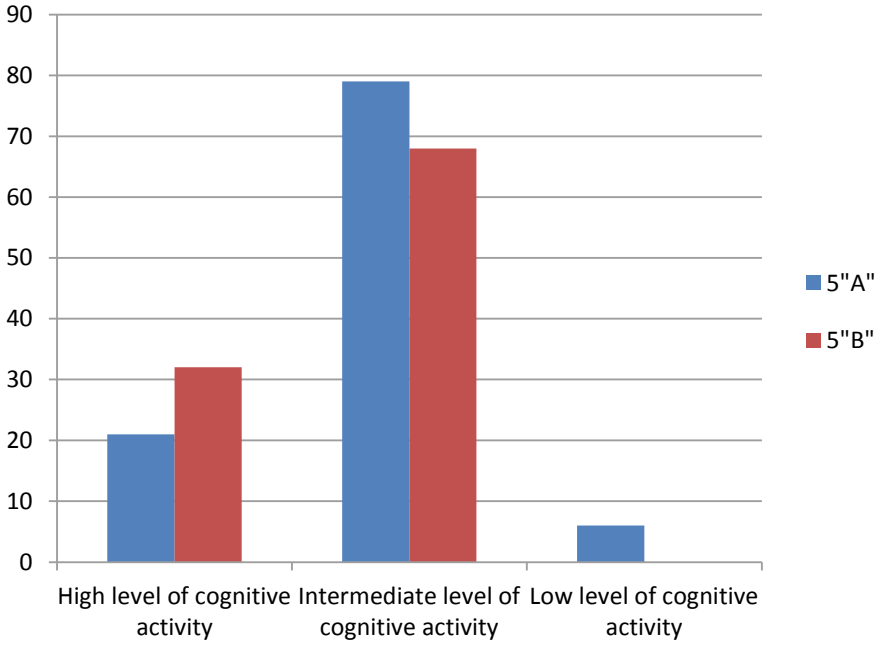

Fig. 46.2 The results of the study of the cognitive activity of students after the end of the experiment. *Source* Developed and compiled by the authors

It can be concluded that the average cognitive activity of the experimental group increased much more than in the control group, based on Fig. 46.3 (Smirnova et al., 2019). The average score of students' cognitive activity increased slightly from 29 to 30 points in the control group during the experiment. However, a slight progress in improving the cognitive activity of students, whose average score increased from 26 to 33 points, is seen in the experimental group. It became more interesting for students to study in the classroom when their learning is carried out using game teaching methods.

46.4 Conclusion

Integration of cognitive activity is, first of all, an active study of the surrounding reality by a person. Cognitive activity cannot exist without the need for independent study and assimilation of various knowledge and skills, as well as the very important ability to analyze one's own actions and evaluate them.

The content, process, methods, techniques of mastering knowledge are of equal importance for middle-level students, therefore, we will consider game teaching

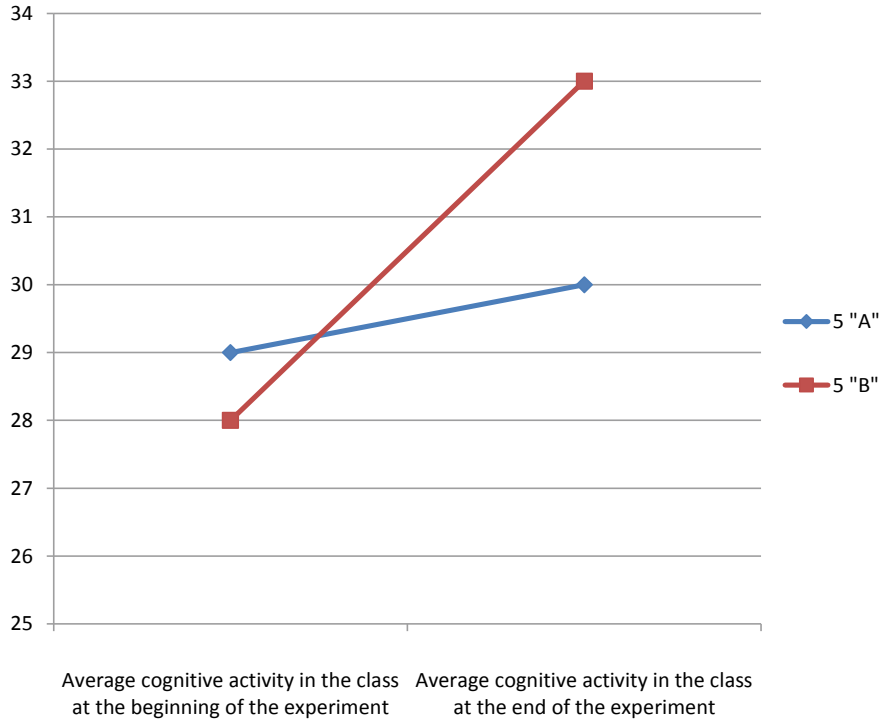

Fig. 46.3 The results of the study of average cognitive activity in classes at the beginning and end of the study. *Source* Developed and compiled by the authors

methods that contribute to the most fruitful implementation of all components of the cognitive activity of schoolchildren in the next paragraph.

Today there is a fairly large number of pedagogical teaching technologies, both traditional and innovative. It is very important for a teacher to be able to use new approaches in the educational process in order to achieve the goals of the Federal State Educational Standard of the new generation. It is necessary to think much more carefully about the structure of the lesson to prepare the lesson using game teaching methods (Lizunkov et al., 2021).

It is important to set competent tasks that would be understandable to students. It is necessary to think over such a scenario when choosing a game so that the game is emotionally saturated, which will make the knowledge gained during the lesson more memorable. Lesson material should include not only events and situations, but also specific visual images. If this method is used systematically and correctly combined with ordinary didactic exercises, then the likelihood of an increase in cognitive activity and the level of knowledge is very high.

Recommendations for organizing and conducting game methods in a Technology lesson:

– the decision to include the game in the curriculum should be made in advance, preferably at the stage of developing thematic planning;
– it is necessary to select equipment in detail and take care of the technical side of the lesson in advance;
– the use of playful methods must be systematic and purposeful;
– it is necessary to correctly and clearly formulate tasks, conditions, and rules of the game and be able to convey them to students;
– it is necessary to ensure that all students participate in the game;
– didactic game requires objective criteria for assessing the participants and the dynamics of its implementation.

The teacher should provide ways out of difficulties for students, ways of providing assistance, means of incentives for intermediate points.

It is very important to sum up the results of the game and conduct reflection both with the children discussing the knowledge gained, and independently, analyzing the learning outcomes.

The following work was carried out to increase the effectiveness of the development of students and the level of mastering the program in the subject Technology:

– study of literature on the topic and analysis of the Technology working curriculum for 5th class;
– studying the features of this age;
– development of guidelines for the use of game methods in Technology lessons;
– delivering developed lessons;
– evaluation of the effectiveness of the work done.

The study involved students of 5th classes. As a result of the experiment, we can conclude that the cognitive activity of students increases through the use of non-standard teaching methods, specifically game technologies. The average cognitive activity of the experimental group increased much more than in the control group.

The effectiveness of the use of game teaching methods in Technology lessons at school has been proven on the basis of the work carried out.

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Current Problems and Perspectives of Development of Digital Higher Education in Russia and Central Asia in the Decade of Action (Conclusion)

Central Asia is a progressive region of the world, in which digital higher education, which only arises in other regions, is a modern reality. This book has shown that digital higher education does the following:

- contributes to the cultural (ethnic, gender, and age) inclusivity and development of international education in Central Asia and Russia;
- has an important role for the sustainable development (implementation of the SDGs) of regions in Central Asia and Russia;
- generates advantages for the optimization of the labor market, training of personnel (including digital personnel), and employment of youth in Central Asia and Russia;
- stimulates the increase of quality and effectiveness of the higher education system on the whole and in separate universities, in particular in Central Asia and Russia.

The contribution of this book to the development of literature on the topic of higher education consists in substantiating the central role of digitalization in preserving the cultural identity and adapting universities to the specifics of Central Asia. At the same time, new scientific results, obtained in this book, threw light on the current problems and perspectives of the development of digital higher education in Russia and Central Asia, which are especially urgent in the Decade of Action. EdTech is a perspective growth vector of economies of Central Asia, i.e., it possesses the potential to contribute to the practical implementation of SDG 8 and SDG 9. Further studies should be devoted to the determination and search for opportunities to implement this potential.

Digital higher education also allows achieving gender neutrality (supporting SDG 5) and cultural inclusivity (supporting SDG 10), which perspective grows in the course of the increase of the hi-tech character of EdTech. That's why these perspectives require further elaboration in the course of the transition to the next stages of the Fourth Industrial Revolution. At last, the potential of development of corporate ecological responsibility, responsible communities, and sustainable cities

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(supporting SDG 11 and SDG 12) based on digital higher education has been tentatively studied in this book and thus should become the subject of future scientific research.

Thus, this book has thrown light on the modern empirical experience and set the scientific and methodological framework for further study of digital higher education in Central Asia. The developed recommendations and determined frameworks are illustrative and useful for countries from other regions of the world.