Analytical report
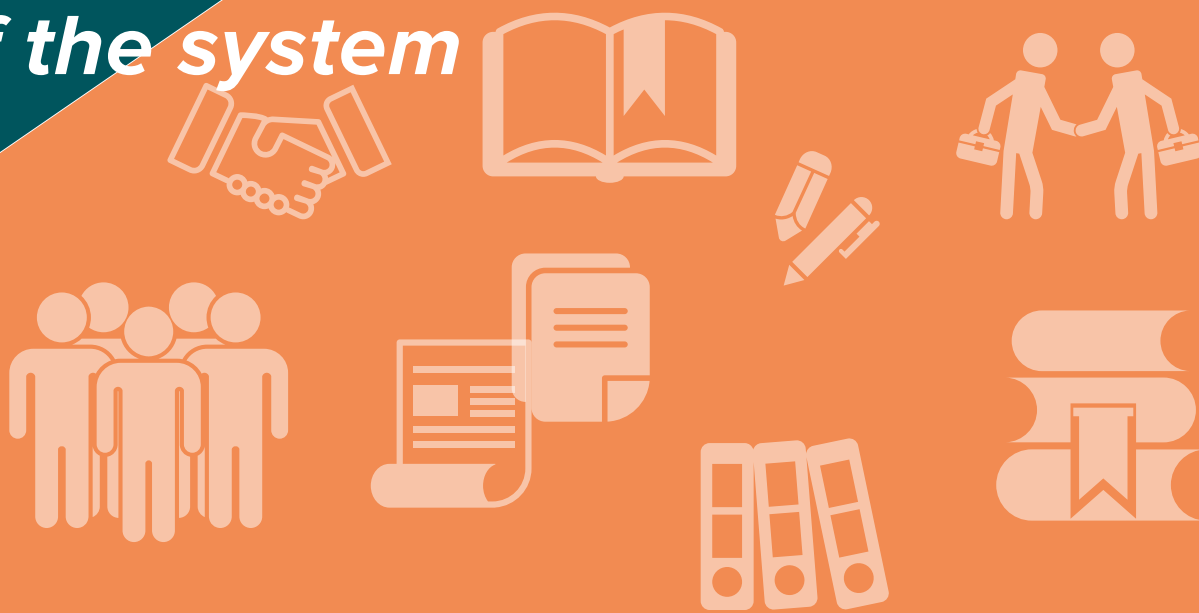
HIGHER EDUCATION: LESSONS LEARNED FROM THE PANDEMIC

Operational and strategic measures on the development of the system

2020

Teams from thirteen Russian universities have implemented this report based on their research on the problems and prospects of higher education during and after the current pandemic. A group of rectors and experts initiated the study at the beginning of the spread of the coronavirus infection, Covid-19. It was personally supported by the Minister of Science and Higher Education V.N. Falkov.

The first part of the research, analyzing the higher education system's readiness for the pandemic situation and assessing the actions of universities and the readiness of the regulator to establish a system, was presented in June 2020. The report "Lessons of the 'stress test': universities in the pandemic and after it" was published. Its main conclusions were discussed at numerous expert sites at the national and international levels. Several theses of the report became the basis for proposals for adjusting plans for implementing the national projects "Education" and "Science", the current activity of the departments of the Ministry of Science and Higher Education of the Russian Federation.

The second part of the work was the synthesis of sociological research data collected in March–July 2020. It was devoted to proposals for strategic and operational measures to develop the higher education system in the new conditions.

The team hopes that proposed solutions at the level of activity of the regulator and universities will provide material for professional discussions and become the basis for the developing and implementing a strategy for the future development of the higher education system in the Russian Federation.

Contents

Introduction

There is no doubt that 2020 has become a time for rethinking usual ideas and approaches in the education system. The driving force of this was the outbreak of a pandemic, which set a number of new requirements for the life and work of the universities. The crisis has changed people's traditional way of life and affected the features of higher education, which in many countries had become a basic social norm and an important tool for socioeconomic development. To a significant extent, this applies to the Russian higher education system, which includes more than 4 million students and more than 600 thousand university employees. Online formats, remote technologies, proctoring, digital educational environments—these and much more have become a part of a new educational reality into which students, teachers, and administrators were involuntarily plunged over the past months.

The task of ensuring the continuity of basic activities in the new conditions was relevant for universities:

- completing the academic year
- conducting tests and exams that include the online defense of final qualification works and master's theses
- organizing admission campaigns.

The significant contexts of these problems were decreased extrabudgetary incomes of universities, growth of unforeseen expenses in connection with the pandemic and the transition to online education, devaluation of spending limits that depend on the ruble exchange rate, social instability, and the uncertainty of epidemiological forecasts.

As it has for many countries worldwide, the experience of distance work and study has shown that the Russian higher education system faces several challenges. Some of them are associated with problems that existed before the pandemic; those problems were aggravated by the onset of the pandemic. Others are new challenges and growth points. Challenges cannot be ignored, especially in the context of second-wave risks. The reaction to these challenges creates conditions for

global competitiveness and the Russian higher education system's leadership.

The ongoing crisis has provoked rethinking educational models in universities based on full-time communication between a teacher and a student that have been in place since the advent of medieval universities. In the current situation, an in-depth analysis of the effects on higher education of the crisis is relevant and can elaborate solutions to mitigate the negative consequences of the pandemic and ensure the sustainable development of universities in the new conditions. This is the goal set by the authors of the current study, which logically continues the discussion opened in the report "Lessons from the stress test: universities in the pandemic and after it" published in June 2020 by the initial rector group.

This report attempts to systematize the domestic higher education system's key deficits and outline ways to overcome them. The material is from several dozens of large-scale studies, including surveys, focus groups, and interviews of students, teachers, and administrators, and a wide review of open sources and public analytical and reporting materials of universities. The studies were carried out both before and during the pandemic, which enables tracking dynamics and trends.

Ten major areas of universities' activities are considered: personnel potential, student development, updating educational programs, strengthening infrastructure, creating a new university management model, access to education, research and innovation, state regulation, development of the higher education network, and economic sustainability. Each of the ten sections contains both a description of problem areas and a list of proposals for addressing them. To describe the solutions, there is a frame that includes two vectors. The first vector is at what level decisions

should be made—the regulator's level or the level of the university. The second vector is the perspective of decision making—operational (short-term) and strategic (long-term).

This form makes it possible to use the text not only as analytical material but also as a practical framework for the formulating a development strategy at various levels: federal, regional, and organizational.

The authors of the report were experts from various universities throughout the Russian Federation. In this context, the material represents not only the opinion of a narrow group of selected universities. However, it contains a range of approaches and points of view based on a large array of sociological research data. Each of the universities participating in the study involved its own experience and achievements obtained during several months of remote work during the pandemic. Representatives of the Ministry of Science and Higher Education, the Public Council under the Ministry, the Russian Council of Rectors, and international experts took part in the expert discussion. This fact made it possible to consider existing international and Russian trends, regulatory and legal realities, and strategic directions of the country's socioeconomic development in the proposed solutions and vectors of development. Personal participation of the Minister of Science and Higher Education V.N. Falkov in the discussion of the tasks and results of the study allowed including some of the developed developed in the current activities of the departments of the ministry and subordinate organizations in the summer.

1

Updating the competencies of higher education teachers as a direction for the higher education system

Among many areas of renewal of the higher education system, one of the most noticeable is personnel. Over the years, many universities have updated their development strategies to include capacity-building programs. The development of teacher competencies has become the task of many academic leadership programs, such as the "5-100" project, supporting universities and research universities, and the modernization of pedagogical education. However, many challenges in this area continue to be relevant, and teachers' weak readiness to change and work in the digital environment is one of the fundamental ones. Such a challenge was formulated as part of a survey of rectors of Russian universities on the experience of working in a regime of restrictions caused by the coronavirus pandemic, conducted in the spring of 2020 at the request of the Ministry of Science and Higher Education. Forty-five rectors of Russian universities took part in the survey. Several months of remote work in the coronavirus pandemic conditions showed the existing problem zones with greater sharpness.

Inability to use new technologies

One of the most significant deficits remains the lack of university teachers' readiness to use modern educational technologies. Such technologies include both e-learning tools and new pedagogical practices. At the same time, a certain proportion of teachers have rich academic and research experience, and its integration with modern technologies and educational practices could become an additional resource for solving the tasks of the national projects "Education" and "Science." However, so far, this resource remains unused.

> 60%

percent of teachers rarely or never delivered lectures and classes in electronic format or webinar format

Methodological deficits

Methodological deficit is the lack of knowledge and practice in the inclusion of online formats and tools in implementing educational courses and programs because of a need for new digital didactics and work methods. The past months of the pandemic have shown that the most effective model of educational activity is the mixed model, when there is a combination of face-to-face and online formats. Such an integrated approach requires teachers to master new technical tools and instruments and master new professional practices. Among them:

▪ readiness to regularly and systematically update the content of educational programs. Increasing access for students to new research, publications, and materials in open Internet

sources also requires the teacher to update the course's educational materials constantly;

▪ use of active learning strategies oriented towards the practical activities of students on an equal basis with the acquisition of fundamental knowledge, enabling optimizing the number of passive interaction formats focused on reading educational material;

▪ readiness to engage students in interactive activities during online classes, attention management;

▪ ability to provide regular feedback, both online and throughout the course;

▪ ability to apply current online assessment techniques for intermediate and final certification.

Technical and technological deficits

Technical and technological deficits are primarily associated with a low level of digital literacy. Some teachers do not understand (or do not understand enough) modern information technologies to implement courses and programs using current electronic services and tools. A vivid manifestation of this lack of readiness can be ignorance and non-use of

technologies in the following areas:

▪ the technology of organizing and conducting online classes using both university LMS and third-party electronic services;

▪ technologies for communication, support, and maintenance of students by using instant messengers, social networks, document collaboration services;

53%

of students surveyed say that at their universities, all or some teachers transferred the materials of their classes to the Learning Management System (LMS) of the university

▦ digital tools for designing and preparing electronic content for interactive online classes and self-work of students.

Related factors exacerbate such deficits:
▦ the obsolescence of course content;
▦ the breakdown of research and educational activities;
▦ the resulting decrease in teachers' motivation to integrate online tools into their educational programs.

The technical and technological lack of readiness of teachers leads to professional fatigue accumulating over several months.

88,2%

of teachers are skeptical of the format of distance learning

42,7%

believe that the electronic format will lead to a deterioration in the quality of higher education in a year

67%

of teachers do not agree that in a year most classes will be in the online format

Teacher Assistance

Simultaneously, the past few months' experiences have demonstrated that the university system can still function in a new mode in organizing the management of universities and implementing the educational process. The administration and teachers recognize the lack of competencies described above. Universities have made serious efforts to adapt the faculties. 53.2 percent of teachers have completed online education courses in recent months, although 87.8 percent of teachers claim that it is better to conduct their classes in a full-time format.

These efforts had a positive result. Studies conducted during the transition to e-learning indicate that many universities have organized a special support system for teachers. Sites or sections of official sites were created to inform and help teachers; online communication with them through messengers was organized.

Thus, with a general constructive attitude and the actual possibility of mobilizing and introducing digital technologies into the educational process, most teachers remain cautious, partly pessimistic. A notable por-

tion of the faculty, although it went online, remains unprepared for integrating online tools and technologies into educational programs in the long term. The forced surge in the use of e-learning, on one hand, expands the possibilities of updating the higher education system, but, on the other, in the event of a decrease in the activity of the regulator and university management, it creates risks of a rapid rollback of the system or even an increase in opposition to the development of digital tools and practices.

53%

31,9%

1st survey   2nd survey

There was a decrease in the proportion of teachers who noted that more than half of colleagues experience or experienced difficulties at their universities or experienced difficulties using the technique or programs needed to conduct classes in electronic format.
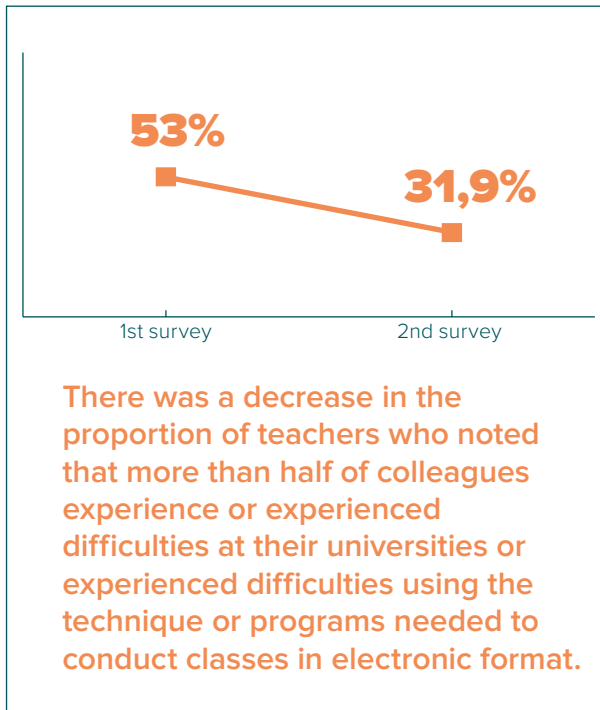
98,2%

of teachers say that during the pandemic, they were able to switch to electronic work

91%

said that the measures taken in their educational institutions were sufficient to implement such a transition

Proposed measures

The past few months have made it possible for university teachers to gain experience in direct work in the format of e-learning. The transition to e-learning has become a window of opportunity. A new experience, supported by systems solutions, could be a resource to overcome the shortfalls described. It is important that the proposed solutions need to be supportive and strategic, changing the system in the long term. Hereinafter, all solutions cover two-time circuits—operational (short-term) and strategic (long-term), and are also described both at the regulator level and at the level of universities. The federal level means regulation of the industry and specific universities that directly carry out educational, scientific, and innovative activities. The university level is implemented both in the format of initiatives of the universities themselves and in the ministry's mode of recommendations.

UNIVERSITY LEVEL

Operational measures:

- development of a model and descriptor system for assessing digital competencies (taking into account university profiles);

- introduction of a monitoring and incentive system for teachers to use digital technologies in teaching (including the introduction of indicators into contracts);

- creation for teachers of digital logistics (process) maps-algorithms of the main processes that facilitate orientation in electronic information educational environments;

- development of interuniversity seminars and symposia aimed at sharing experiences and practices in online education;

- development of "digital volunteering" to help older teachers;

- update of functional models of teachers' activity, including in connection with the roles of facilitator, moderator, tutor.

Strategic measures:

- development of modular digital literacy programs through the development of a network of regional universities and other partners;

- formation of an ecosystem of Internet services of methodological support of teachers;

- inclusion in educational programs of nonpedagogical universities of modules for introduction into modern pedagogy;

- development of a system of certification and evaluation of the quality of courses, including by students;

- creation of personnel reserve programs in universities taking into account the results of the implementation of the relevant federal programs;

- establishment in universities of centers for the development of pedagogical practices and/or professional schools of education that affect the university's entire educational space.

FEDERAL LEVEL

Operational measures:

- creation of a list of recommended resources and digital tools for designing online courses, independent examination of selected resources, and prevention of monopolization of the market by them;

- grant support for young teachers and researchers in the field of modern didactics;

- in 2021 a competition of projects and scientific developments on the issues of modern university didactics and online education;

- support for the annual international interuniversity research conference on modern didactics of higher education;

- update of teacher structure and workload models to include prerecorded education materials, including updating courses and preparing materials for each distance session;

- development of recommendations for the inclusion in an effective contract of indicators that encourage the use of e-learning;

- expansion of the practice of certifying the competencies of teachers, as well as including elements of certification (professional examination) in the structure of educational programs for advanced education and retraining;

- launch of long-term research in digital educational technologies and digital didactics with an introduction to pedagogical practice.

Strategic measures:

- establishment of a national teacher testing service for digital literacy and national monitoring;

- development of recommendations to universities on the allocation of funds for professional development to increase the level of digital literacy of teachers;

- establishment of internal and international academic mobility programs for staff, including virtual staff, to enhance pedagogical competence;

- creation of a targeted grant support program for in-university teacher communities implementing innovative practices;

- introduction of an integration platform of a modern digital educational environment, which should provide access to open online courses aimed at the development of digital competencies and current pedagogical practices;

- development of recommendations and typal models for inclusion of online courses and content in the educational program;

- formation of a network of pilot sites based on consortia of universities, scientific organizations, and businesses, primarily in the field of edtech and the design of new online education practices;

- performance of long-term research on digital educational technologies and digital didactics with the introduction of pedagogical practice.

2

Measures to support students in the new environment

The attitude of students to the actions of universities during the pandemic

In the context of the coronavirus pandemic, significant changes have occurred in the life and educational process of students, associated with the transfer of the educational process (including design and scientific work, exams) to an electronic format: a sharp reduction in the extra-educational burden and in out-of-school interaction with other students and teachers, exacerbation of social problems, and issues of access to the necessary technologies. Those changes determined the attitude of students to the current situation. A study of how students assess the effectiveness of distance learning has shown the following.

46%

of students at the beginning of the pandemic considered the electronic learning format less effective

First poll wave, April 2020
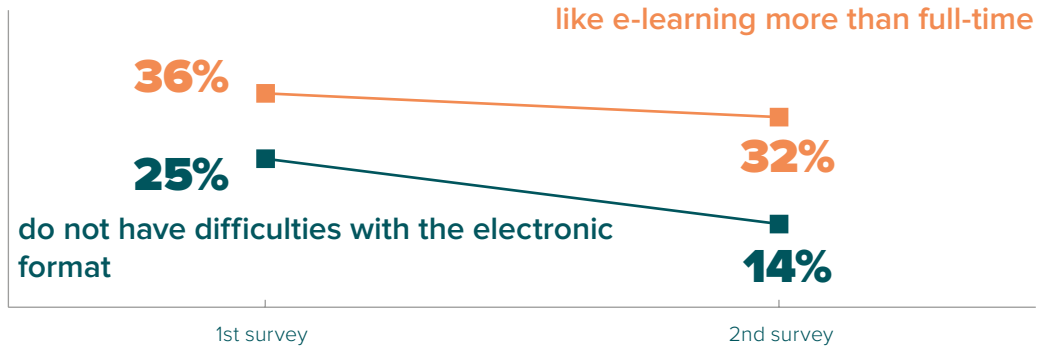
49%
say that there is more free time

64%
have more time to sleep

55%
became less tired of studying

Second poll wave, July 2020

like e-learning more than full-time

36%

32%

25%
do not have difficulties with the electronic format

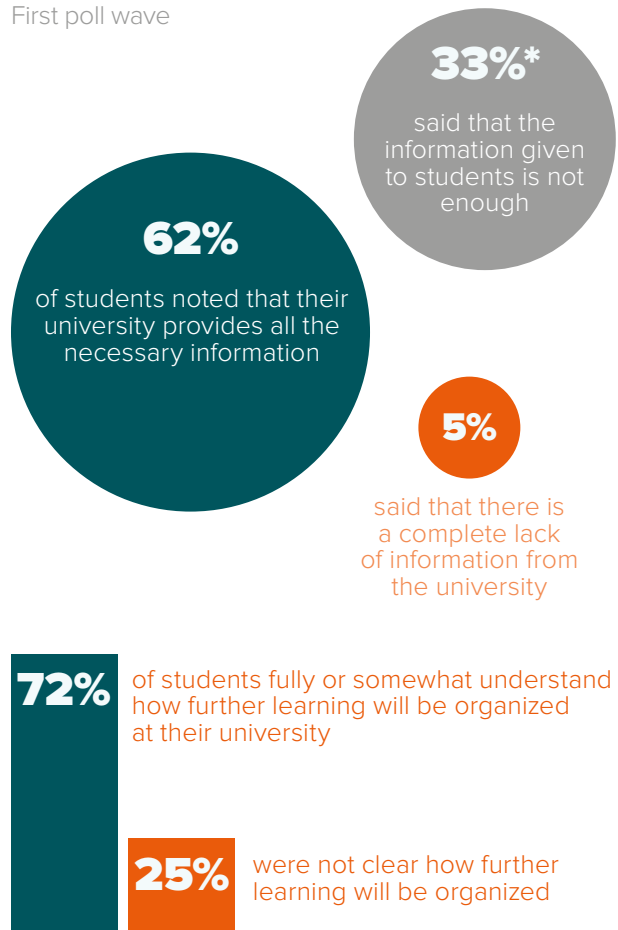**14%**

1st survey   2nd survey

Awareness problem

One of the first steps in the organization of the educational process was informing students of the new rules of study in electronic format and about communication tools. This problem was especially acute on the eve of the exams: data from a survey conducted in May 2020 indicated the emergence of problems with students' awareness of holding the session in an electronic format. Only half of the respondents knew about the exams' formats; 40 percent were not aware of how the defense of coursework and theses would be organized.

A relatively high proportion of students who report problems with information are in medicine, technical sciences, art, and culture.

* The second wave of the survey showed a deterioration in the assessment of full information support from the university to 40 percent. It is assumed that these changes were related to the upcoming session.

First poll wave

33%*
said that the information given to students is not enough

62%
of students noted that their university provides all the necessary information

5%
said that there is a complete lack of information from the university

72%
of students fully or somewhat understand how further learning will be organized at their university

25%
were not clear how further learning will be organized

Social-psychological problems caused by the pandemic

The following area of problems is related to sociopsychological issues caused by the unusual format of e-learning.

In the first wave of polling, lack of face-to-face discussions with teachers was noted by 34 percent. The following problems were quite common:

▪ It is not easy to focus on independent study of the material (29 percent).
▪ It is not easy to study in a home environment (28 percent).
▪ It is more difficult to ask questions of the teacher (27 percent).
▪ There is a feeling of loneliness and isolation (25 percent).

Almost a third of students feel embarrassed and uncomfortable when a teacher asks them to turn on a webcam, and 35 percent of students find it difficult to ask questions to the teacher online. At the same time, a quarter of respondents noted that it is easier for them to ask questions to the teacher with the electronic format.

In the second wave of polling, there was an increase of about 10 percent in indications of problems:

▪ "It is difficult to keep attention when watching video lectures."
▪ "It is difficult to focus on when studying the material independently."
▪ "It is difficult to answer questions and ask them."
▪ "It is difficult to find a place to study," "lack of communication with classmates."

40 percent began to postpone the completion of tasks more often. This problem is most common among first-year students.

The results of the surveys show the difficulties of adapting to the change in the format of education and communication in the educational process and the psychological difficulties associated with the introduction of a self-isolation regime; this problem is especially acute for those students who remained in dormitories and were deprived of personal contact with friends. Separately, note that there were difficulties if it was necessary to have a higher level of self-organization. Many students note a lack of self-organization skills, while this is most worrying for junior students. In students, there is an increase in fatigue and a significant increase in load, caused, among other things, by an increase in the share of independent learning. At the end of May 2020, a third of students claimed that it was difficult for them to focus on independent study of the material, which indicates negative changes - in March, the share of such students was only

> 40%

note the lack of face-to-face communication with teachers and fellow students as the main difficulty of distance learning

17%

increase in the proportion of students who note discomfort due to the need to include a webcam at the request of the teacher

27 percent. To this must be added such negative factors as the loss of work and the decline in other sources of income, the problems encountered with tuition payment, and the exacerbation of property inequality, including in digital learning tools. At the same time, most universities did not implement effective programs for psychological assistance to students in a difficult educational and sociopsychological situation.

Support for student psychological resilience

Student years are seen as a critical period of time when students move from late youth to adulthood. This is a susceptible stage in the life cycle, at which emotional problems and mental disorders often arise. Approximately 75 percent of lifelong mental disorders begin before 24, and these cases have more complex consequences. Also, the student years are associated with a significant increase in risky health behaviors. In a pandemic situation, these patterns are aggravated. In the world, the problems of psychological well-being of students are actively investigated through such topics as psychological health and inequality of students, the relationship of physical and mental health with the academic performance of students, mental disorders, suicidal thoughts and inappropriate behavior, psychopathology and self-harm, the effect of anxiety and educational stress on academic success, game dependence among students, depression among students, and others.

As the coronavirus pandemic has shown, maintaining psychological resilience is extremely important with prolonged self-isolation. Students in pandemic and isolation settings, physical deprivation, forced loneliness, and excessive freedom for which a student is generally unprepared, may experience certain symptoms such as stress, fear, panic, anxiety, cynicism, and denial.

As a solution to the problem, universities in different countries offer psychological assistance in online consultations to students and teachers.

Australia's Monash University holds regular online meditation and awareness classes, which were formerly on campus, for everyone.

In the US, Johns Hopkins University has given all its students access to a safe online cognitive science therapy program.

Some universities invite students who are a few minutes away to attend personal meetings, although students are advised to move consultations with a psychologist online.

Ohio University professor Margaret Price instructed her students to keep a personal "mindfulness diary" until the end of the semester.

The Mutual Support Network at the University of Michigan holds meetings that discuss anxiety, self-care, and healthy family or neighborhood relationships related to COVID-19.

Worldwide, such examples of a conscious attitude toward one's psychological state are becoming more and more prevalent. Many universities traditionally consider students' psychological concerns to be an important component of academic achievement and have appropriate services—counseling and psychological services. These services have responded actively to the pandemic.

> The University of Melbourne provides support to students and staff during the pandemic. The psychological service provides free, confidential consultations, and the university's website contains advice on coping with possible stress and anxiety, collected useful resources, and seminars on personal development, mental health, and well-being.

There are several global organizations and projects aimed at maintaining the psychological well-being of students. In Russian practice, there are no large-scale national studies and reports on the psychological health of young people and students. The main attention is paid to Russian universities' actions in supporting the employment of students and their economic situation: more than 100 universities have taken emergency measures in this direction. However, there is almost no news about psychological support provided by universities to students.

Nevertheless, a search revealed some examples of psychological assistance by universities to students.

> Tomsk State University has issued a memo to maintain the stable psychosocial condition of residents in conditions of forced quarantine due to coronavirus, and also maintains a hotline for the period of self-isolation and conducts remote counseling.

> The Higher School of Economics has a Center for Psychological Counseling—consultations are held in an online format and are available to students, graduate students, employees, parents, and graduates. In the pandemic, the Mental Health Spring project was launched: events are held at ZOOM and live on Instagram (lectures, yoga, and meditation). There is also a hotline for students and graduate students, group programs are being conducted, self-help materials are posted on the site, and thematic articles are published.

> The Baltic Federal University named after I. Kant organizes psychological and physical unloading procedures for students: an additional day off, relaxation programs (including online), and rehabilitation with university medical volunteers.

> The Financial University under the Government of the Russian Federation organized psychological support for students and employees through Skype or a written response by e-mail. On the university website, students can get see psychologists' recommendations regarding the conditions of the pandemic.

> Kuban State University has posted psychological recommendations "How to act in a pandemic situation (COVID-19)" and is conducting online consultations.

However, in general, there is currently a shortage of such support; additional measures are in demand for psychological support for students.

Technology and Internet access challenges

During the pandemic, problems were manifested in students' access to the necessary technologies and the Internet, and technical failures were evident.

99%

of students have Internet access at home

52%

of students faced technical problems of various kinds and interruptions on the Internet. In the first wave of polling, this figure was 34%

93%

of students have a personal computer or laptop

30 percent of students from low-income population groups (9 percent of the sample) do not have enough functional technology. Often, these students cannot purchase a new device due to financial constraints.

84%

of students say that the technology available to them fully or mostly meets the functional requirements necessary for learning

Problems of international students

Separately, it is important to highlight the problems that international students have faced during the pandemic. Studies of international organizations and experts document problems with finance and medical insurance, difficulties in adapting to new cultural norms and longing for home; lack of sociocultural adaptation and involvement in the host society; and language barriers.

A study conducted by the Erasmus Student Network on the impact of the COVID-19 pandemic shows that international students do not always feel that they have sufficient access to information since most information is available only in the national language.

In addition to contradictory information and diversity of countries' measures at the national level, this causes students a sense of confusion and isolation. International students faced great difficulties or even the inability to return home due to the lack of transport links and border closures. Many students also reported that they were forced to leave dormitories or rented apartments.

Students' psychological complexities became the most important challenge that universities had to deal with, especially at the beginning of the pandemic. The uncertain situation gave rise to emotions among international students, which the students and service members themselves describe as fear, anxiety, and tension. Students who

lived in dormitories experienced a harder situation (it was especially difficult where the dormitories were quarantined). In many universities, the work of psychological support services for students in the first weeks of the pandemic was organized (or strengthened). This turned out to be very popular. In most cases, students were informed of such services, but opposite situations were also found. Also, the leaders note that not all students were ready to contact the support services due to the national culture. In general, international students received much more attention, and relations with the representatives of services began to be less formal, more individual (in some cases, almost child–parental relations).

Leisure activities for international students planned before the pandemic were canceled. Often, students noted boredom and idleness. Many universities tried to organize students' leisure by distance, creating reasons for collective online activities, but often they did not have a great response.

The features of fieldwork aggravated the degree of stress: In those regions where the pandemic was expected to end quickly, the completion of the self-isolation regime increased discontent from students, since they did not take the opportunity to go home, and the transition to a distance learning format was postponed.

Both students and employees of international services noted the deterioration of the financial situation of international students. It is associated with interruptions, inability to receive financial assistance from relatives, or loss of the possibility of additional earnings. Against this background, universities resorted to various means of material support:
- postponement of education fees, and in rare cases reduction of the cost of education;
- cancellation of dormitory payment (in some cases), free Wi-Fi;
- in-kind assistance with products in the form of both delivery and full payment. In several regional universities, an extremely informal approach was found when personal products were brought from garden plots and orders were paid from cafes;
- employment of students (work on campuses, in call centers, digital volunteers, etc.): in some cases, they employed the neediest, in other cases on different grounds (abilities) along with Russian students.

Some international students received additional material assistance from embassies of their countries.

As for the problems with the transition to e-learning, it can be noted that there are no fundamental differences in the organization of e-learning for international and Russian students: they experienced the same difficulties. However, the transition to e-learning for international students was more difficult due to language difficulties. Some students noted a significant deterioration in their knowledge of the Russian language during the pandemic due to the lack of a previously available communicative environment, that is, a decrease in the density of interaction with Russian-speaking students and teachers. Since the probability of successful implementation of the educational program in electronic format depends on the specifics of the content of the discipline, special difficulties arose in the course "Russian as a foreign language" related to the specifics of learning the language, carried out through the transmission of many symbolic systems, which is difficult in the electronic format. Also, some difficulties in learning have arisen for students who have returned home, for example, to China, where, due to national specifics, it is not possible to use some sites, programs, and platforms.

According to a survey of education experts at 170 US universities, 83 percent of respondents expect a significant reduction in the number of new international students in the fall semester of 2020[1]. Most ranked universities depend heavily on Chinese students, who make up 23 percent of international students worldwide. For example, the American Council on Education predicts a 25 percent decline in international students' share in the United States[2].

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[1] COVID-19 Report: an outlook for International Student Recruitment. URL: https://studyportals.com/intelligence/covid-19-report-an-outlook-for-international-studentrecruitment/

[2] American Council on Education. URL: https://www.acenet.edu/ Documents/Letter-House-Higher-Ed-Supplemental-Request-040920.pdf

If before the pandemic, universities were aimed at increasing the number of international students (except those who have this number limited by objective circumstances, for example, the number of places in dormitories), then after that was an expectation of a decrease in the number of international students, failure to meet the indicators. Forecasts for the number of recruits in 2020 are different–from 15 percent to 50 percent compared to last year's recruitment, but some universities claim that they will meet the recruitment plan. Universities have concerns about the quality of recruitment that is carried out using exclusively electronic forms:

■ It is potentially possible to enter several universities.

■ Some universities may not count students.

■ It is impossible to evaluate foreign applicants for full-time interviews.

■ Some universities note that some students did not come to short-term education programs in the spring of 2020. A shortage of, first of all, contract students is expected in connection with the financial crisis. With quota and budget places in the Russian Federation, there are fewer or no fears.

⚙ *Proposed measures*

The instant universal transition to learning using electronic technologies is changing the students' most important life and socialization processes. They find themselves outside the usual pace of learning and outside live communication, contact with classmates and teachers face to face. Accordingly, one of the development directions in nonstandard conditions is forms of student support, different from traditional ones. These forms are crisis-oriented and consider students' development an important part of the university corporation. This can be implemented through the following solutions.

UNIVERSITY LEVEL

Operational measures:

- activating the role of students in the educational process: managing the student's educational trajectory, creating conditions for the self-organization of study groups (including through the development of digital logistics maps–navigators on the processes related to student education and life at the university);

- changing the structure and workload of students in continuous distance and mixed forms of learning;

- supporting student initiatives aimed at building student online communities;

- organizing specialized sections on the websites of universities to support students, directly and through hotlines, SOS buttons;

- creating a system for the temporary use of computer equipment by students, and subsidizing the upgrade of their personal devices for use in distance learning;

- establishing psychosocial support centers for students providing psychological support, including in online format, at universities;

- implementing student employment programs: the creation of temporary jobs at universities;

- extending fellowships and grants for postgraduate and undergraduate students involved in research projects.

Strategic measures:

- introducing a model and methods for supporting group life-education routes (service book, digital portfolio), including using the resources of the institute of tutors, editors, mentors;

- developing online formats for student olympiads and case championships, and other tools for an external independent assessment of the quality of education;

- establishing grant support programs for the formation and development of soft and self-skills: competencies of self-organization, planning, self-management, time management, etc.; involving students in the management of their own educational route with the possibility of changing it;

- stimulating student readiness for constructive dialogue through the organization and support of student media centers.

FEDERAL REGULATORY LEVEL

Operational measures:

- changes to the annual quota admissions plan (redistribution of admissions to countries not affected by coronavirus);

- amendments to the "Procedure for admission to study under higher education educational programs - undergraduate programs, specialty programs, master's programs" in terms of extending the terms for accepting documents from foreign applicants, including allowing universities to set terms for admission to the magistracy at their discretion (taking into account possible ranges);

- amendments to the Order of the Ministry of Education and Science of the Russian Federation dated August 23, 2017, No. 816 "On Approval of the Procedure for the Use by Organizations Conducting Educational Activities, E-Learning, Remote Educational Technologies in the Implementation of Educational Programs" expanding the list of specialties and areas of education in which training is allowed using remote educational technologies.

Strategic measures:

- developing measures to monitor the effectiveness of the scholarship fund;

- developing new life education route insurance formats with the participation of leading insurance companies, employers, and universities;

- encouraging the establishment of an association to support the psychological and social well-being of students;

- supporting case studies on student support and conferences for the exchange of experience with international researchers;

- regular monitoring of the state of psychological well-being of students in

the Russian Federation, identification of significant risk factors, monitoring available infrastructure for ensuring psychological well-being and its quality;

- creating a motivational model of scholarship support (the basic size of the state scholarship should be brought to the level of the subsistence minimum in the corresponding region, including from 2021, students and prize-winners of the all-Russian olympiads of schoolchildren;

- creating an all-Russian portal of vacancies for students and graduates of universities, providing them with the opportunity to find jobs, including remote ones.

Trends of educational process transformation, promotion of digital technologies and new didactics

No common platform solutions

The forced mass transition to e-learning revealed a number of key problems, one of which was, on one hand, the abundance of private online educational platforms, and on the other, the lack of generally accepted platform solutions for conducting classes online, as well as the lack of a unified means of communication between students and teachers of various disciplines in one university. As a rule, teachers make a choice of resources for organizing the education process, and much depends on their experience and competence in the field of electronic technology.

Underdeveloped digital learning

In Russian practice, e-education involved taking online courses, which led to the underdevelopment of online teaching practices. The previously developed online courses were critically insufficient to organize e-learning in universities in a crisis. As a result, in most cases, universities opted for online education and not for readymade online courses. Online teaching opens up many new opportunities, primarily related to multichannel pedagogical communication: a video, a presentation, a live talk by a teacher, a student group chat. However, the universal transition to e-learning clearly showed a great shortage of worked-out unified educational methods in digital

pedagogy: University teachers invented their techniques by trial and error or borrowed them from practitioners in related fields (leading online conferences, business coaches, and even teenaged streamers). It became clear that the traditional techniques of retaining the audience's attention, organizing the work of students (including group work), and monitoring required a radical revision for online teaching. It is already clear that the student's motivation will be the teacher's key task with much e-learning. The quality of the educational process will depend on the teacher's ability to keep the students' attention, determine the goals of the students' work on the course, and organize and maintain a high proportion of independent work in a specific educational exercise and throughout the course. At the moment, there are no tools for systematic work with the motivation of students in universities.

Another aspect of electronic education that strongly influences new didactics is the so-called digital footprint. Making the class session potentially open (in real-time or writing) to any user opens up unique opportunities for the automated analytics of the educational process.

Limitations of existing models of educational programs

The pandemic crisis has sharply exposed barriers and limitations to existing educational programs and methodological and didactic approaches in universities. Universities cannot respond quickly to changing external conditions, because they do not have sufficient flexibility in working, taking into account the individual requests of students. The rapid obsolescence of educational models focused more on the translation of knowledge than on the development of competence and thinking, the critical lack of quality content, its archaic nature—all this leads to a serious decrease in the quality of education.

One of the urgent problems of the current educational process is the constant increase in the volume of information and, at the same time, the rapid obsolescence of knowledge.

According to researchers, the life cycle of knowledge and skills is very short in the modern world. The results of the roundtable "Man and Labor Market" held in 2019 in St. Petersburg in the V Digital City Forum of RBC showed that the situation with the archaic nature of educational content in higher educational institutions of Russia remains unchanged and **the number of students in current specialties that meet the needs of the modern economy is one-third of what business requests**[3].

The urgency of prompt resolution of these problems increases dramatically in the context of the forced transformation of the entire higher education system. A comprehensive solution to these problems is introducing new models of educational programs that correspond to the rate of digitalization of modern society and the creation and promotion of new pedagogy based on current methodological and didactic principles.

Implementating this solution requires an inclusive approach that includes three main areas.

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[3] Крах вузов: в России создается альтернативная система образования // rbc.ru: официальный сайт РБК. URL: https://www.rbc.ru/spb_sz/17/04/2019/5cb-6d1109a79478bb3ffc057 (date of reference: 07.05.2020).

Digitalization

The first is the digitalization of the educational process. In recent years, the high rate of digitalization of various industries has led to the transition of the world's leading universities to electronic forms of learning, where technologies, platforms, and software with a centralized management process and technical support play a key role, which enables focusing in detail on the educational process and increases its efficiency.

Data submitted by educational organizations of higher education showed that most universities are talking about the system's formal presence or the fragmented or experimental use of LMS platforms[4].

However, today, the use of the university's digital educational environment should become everyday practice, and teaching be no longer thought of without the use of automated educational management systems.

In this regard, various practices of universities in the process of transition to e-learning are important. For example, the feedback collection module available based on common software platforms has shown its effectiveness. The collection of information and its subsequent analysis make it possible to quickly respond to emerging problems, which greatly facilitates the university's management as a whole[5].

Noteworthy is the growing popularity of BYOD (Bring Your Own Device) technology[6],

> 88%
of universities say they have LMS platforms

45%
of them actually use LMS to organize educational activities

which ensures personal mobile devices' being in the workflow. When implementing the educational process in the present conditions, such technology allows teachers and students to quickly access electronic educational resources (EER) and online interaction tools, which increases the organization's effectiveness.

Another area of digitalization of education is virtual technologies that increase the interactivity of courses, including, for example, scenario-based learning (SBL), the use of virtual reality (VR) and augmented reality (AR) technologies. Thus, virtual desktop infrastructure (VDI) technology eliminates the dependence of study groups on specific classrooms. Also, teachers can use online tools that mimic a university audience's usual environment, for example, the AWW (A Web Whiteboard) online board. By creating a presence effect, such technologies minimize psychological discomfort, simplify administration and support, and generally make the education modern and convenient.

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[4] Шторм первых недель: как высшее образование шагнуло в реальность пандемии / А.В. Клягин и др.; Нац. исслед. ун-т «Высшая школа экономики», Ин-т образования. М., 2020. (Современная аналитика образования; № 6 (36)).

[5] Кейсы быстрых реакций вузов в период пандемии // Институт образования НИУ ВШЭ: официальный сайт. URL: https://ioe.hse.ru/sao_universitycases (date of reference: 07.05.2020).

[6] Любанец И.И. Использование BYOD технологии в образовательном процессе // Вестник Донецкого

педагогического института. 2018. URL: https://cyberleninka.ru/article/n/ispolzovanie-byodtehnologii-v-obrazovatelnom-protsesse/viewer (date of reference: 07.05.2020).

Today, there are already cases of Russian universities using these technologies. In 2019, the Far Eastern Federal University, as part of the Moscow International Salon of Education (MISE), together with STEM-games, presented a VR course on preparing students for the exam in chemistry. Using VR technologies, students can set up experiments, determine the compositions of solutions, and conduct high-quality reactions. Technical universities also announced their readiness to use VR and AR technologies in the future for student workshops. In the next academic year, distance education technologies in some universities will be widely used in correspondence and additional vocational education.

The introduction of personalization processes using adaptive methods based on artificial intelligence contributes to improving education quality. A similar technique was tested as part of the Island 10-21[7] educational intensive, during which Far East Federal University introduced technological developments at National Technological Initiative University to form individual profiles of competencies and educational trajectories based on the recommendations of artificial intelligence, as well as fixing the digital trace, the results of education. At Tomsk State University, with the support of the IT company Enbisys, an adaptive educational platform has been introduced that provides an individual approach to studying mathematics and allows students to identify and work out gaps in knowledge through a built modular microdevelopment system. Such an adaptive technique is a virtual tutor that aligns the level of knowledge of students without a teacher's participation.

Another key area is the development and use of simulators in the educational process that simulate business scenarios and allow making decisions, developing business strategies, and developing universal and professional competencies. The Financial University under the Government of the Russian Federation has developed four business simulators and dialogue simulators that enable a flexible and adaptive approach to students with different degrees of education and experience based on game scenario settings and organized team and project work to jointly solve management tasks and develop a strategy for effective interaction, model management activities, and train soft and hard skills. The simulator Enterprise Management, developed jointly with the company Labius, is already used in several Russian universities.

The decline in demand for paid educational services caused by the pandemic's economic consequences entails a reduction in university resources. It is an additional challenge for Russian universities to intensify replacing part of courses with high-quality online resources and maximize the effectiveness of traditional full-time teaching to prevent a decrease in the quality of education. However, according to a survey of rectors of Russian educational organizations on the experience of working in the mode of restrictions caused by the coronavirus pandemic, one of the most serious problems is the lack of accessible and effective national online platforms for education.

As the practice of Coursera, the largest platform in the field of mass online education, shows[8] that in April 2020 the number of students enrolled in online courses increased by 644 percent compared to the same period last year, and

[7] «Остров10-21»: первый образовательный интенсив Университета НТИ в ДВФУ // Дальневосточный федеральный университет. URL: https://www.dvfu.ru/news/fefu-news/_island_10_21_the_first_educational_intensive_university_nti_at_the_university/ (date of reference: 07.05.2020).

[8] Mr. Jeff Maggioncalda – The Digital Transformation of Higher Education: COVID-19 and Beyond // YouTube: channel of UNESCO IITE. URL: https://www.youtube.com/watch?v=qTJXAElBSks (date of reference: 07.05.2020).

the number of new Coursera students increased 1500 percent. These dynamics are observed in all regions of the world: The number of students from Russia in April increased 500 percent compared to the same period last year.

Undoubtedly, in this direction, support for the diversification of large interuniversity educational platforms of various orientations, filling them with open online courses of various universities, is very important. Federal support for electronic libraries publicly available to universities and assessing the demand for their use are also needed.

The study showed[9] that 49 percent of universities are fully provided with digital library resources for all educational programs.

The most important element of electronic education's didactics is the proctoring procedure — the organization of control and monitoring of the remote exam. The use of artificial intelligence (AI) is playing an increasingly important role in proctoring platforms. For example, the Examination proctoring platform using AI identifies students and analyzes keystrokes on their computers; the Proctorio platform uses AI technologies to determine the direction of students' vision. Proctoring is beginning to be successfully used in Russian universities: For example, the first remote defenses of graduate qualification work of students using proctoring technology were held at Vyatka State University. A similar practice was implemented at Tambov State University[10]. National Research University of Infor-

98,4%

of Russian universities use courses on the national platform Open Education (43 percent for bachelor's courses, 45 percent for specialties, 32 percent for master's degrees; 35 percent for graduate study). Second place in the ranking is the Coursera platform (13 percent for bachelor's courses, 10 percent for specialties, 12 percent for master's degrees, 11 percent for graduate study). Less involved are native university platforms, and almost no YouTube is used

mation Technologies, Mechanics and Optics uses the proctor remote control system for online examinations.

A survey of rectors of Russian educational organizations of higher education on the experience of working in the COVID-19 pandemic indicated that many universities are waiting for a single decision from the Ministry of Science and Higher Education of the Russian Federation for all universities on the proctoring system.

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[9] Экспресс-анализ возможностей цифровых библиотечных ресурсов и автоматизированных библиотечных информационных систем российских вузов / Нац. исслед. ун-т «Высшая школа экономики», Ин-т образования. М., 2020. (Современная аналитика образования).

[10] Кейсы быстрых реакций вузов в период пандемии // Институт образования НИУ ВШЭ: официальный сайт. URL: https://ioe.hse.ru/sao_universitycases (date of reference: 07.05.2020).

New pedagogy

The second direction is creating and promoting a new pedagogy consisting of educational methods that correspond to current technological opportunities and reflect current socioeconomic challenges.

The massive transition of the country's universities to e-learning has revealed many contradictory trends. On the one hand, it has shown that universities are not ready to use the online teaching format's existing tools massively. Universities and other educational organizations have previously used these technologies, but mostly only for the most motivated students.

On the other hand, the mass practice of using online teaching tools has stimulated a variety of communication between teachers, methodologists, and technologists regarding content renewal and didactic and teaching methods in

social networks, media, professional forums, publications, video reviews, and discussions of various aspects of updating teaching methods and technologies. They discuss the current most popular know-how for organizing education in the new conditions and a change in the fundamental principles of teaching. The inefficiency of direct transfer to the electronic format of didactic approaches and techniques familiar to traditional classroom work is shown. Simultaneously, the huge potential of many tools and practices of online formats remains untapped due to the lack of systemic developments in the didactics of electronic education.

In world practice, the solution to these problems is mixed education, which is effective in those areas of knowledge where close cooperation between the teacher and the student is essential. This allows students to study while personally communicating with an expert in a group or one on one, perform practical work at trainings and seminars, and at the same time engage in online venues without losing the quality and dynamics of the educational process. A joint study by researchers at the Graduate School of Economics National Research University with colleagues at Stanford University and UC Berkeley on the effectiveness of different forms of the survey among Russian engineering students[12] showed that the correctly applied mixed learning format can be as useful as the traditional form. We should note here that the use of the mixed learning model involves the redistributing

38%

of students expressed the opinion that their university and teachers are completely (11 percent) or somewhat (27 percent) not ready for the transition to an electronic learning format

32%

of students at the time of the survey were not satisfied with the organization of e-learning at their university[11]

[11] Шторм первых недель: как высшее образование шагнуло в реальность пандемии / А.В. Клягин и др.; Нац. исслед. ун-т «Высшая школа экономики», Ин-т образования. М., 2020. (Современная аналитика образования; № 6 (36)).

[12] Chirikov I., Semenova T., Maloshonok N., Bettinger E., Kizilcec R.F. Online education platforms scale college STEM instruction with equivalent learning outcomes at lower cost // Science Advances. 2020. URL: https://advances.sciencemag.org/content/6/15/eaay5324 (date of reference: 07.05.2020).

the teacher's load from classroom forms of work to supporting the independent work of students (IWS). The development of approaches to determining the labor intensity of IWS in the electronic environment to avoid overload of the student is key.

Along with the traditional principles of knowledge assessment, opportunities open for alternative reviews. Big data technologies enable making an ongoing assessment of a student's competencies, for example, when analyzing data on students' interaction with electronic learning systems and with each other. The introduction of various knowledge assessment forms contributes to more effective immersion, engagement, and active processing of information, developing research skills, and critical thinking.

New models and content of educational programs

The third direction, closely related to the previous ones, is introducing new models of educational programs by updating the structure and content of existing programs. In the context of the rapid development of a modern high-tech economy, the model of mass education of specialists with standardized qualifications shows inefficiency. Universities lack the necessary resources to significantly change educational models and create their academic programs: Such transformations are associated with high administrative costs, so they are rarely implemented. As a result, standardized, rapidly obsolete, and closed educational programs for external students dominate Russian higher education. Successful solutions within individual education courses and programs do not apply to the rest of the educational space. It is necessary to update the structure and content of existing academic programs by systematic work on creating new educational programs, the qualifications of whose graduates of which will meet the growing needs of the labor market.

In this direction, the most critical processes are transitioning to a modular education system and organizing access to individual modules of external trainees. Courses should consist of short-term educational modules and intensives, which will ensure the synchronization of curricula with partner universities and attract leading teachers from other universities and representatives of the economy's real sector to implement educational disciplines (including using online education formats). The modular education system will also allow universities to attract external students who want additional competencies to separate modules and intensities. It will enable universities to meet the increased demand for education from the mass of people left unemployed by the pandemic crisis. This organization gives universities an incentive to improve the relevance and quality of their training courses and allows lifelong education to become a national norm.

The use of various resources, included in approved university programs and located outside their borders and most appropriate to the needs of the market, increases the effectiveness of the implementation of educational goals and objectives. The development of modern digital technologies requires an organic transition from a traditional to an integrated learning model using electronic environments and resources (MOOC, blended learning technologies, etc.). This integrated learning model increases the motivation of students and stimulates their ability to learn

and seek knowledge. According to the Clayton Christensen Institute[13], which addresses topical issues in health and education, every year the number of universities offering a form of online learning continues to grow; by 2019, half of the higher education courses in the United States would be implemented in an online form. The pandemic situation only reinforced this trend.

Programs and curricula of universities should become more flexible, focused on choosing the content of education, mastered both through a variety of internal elective courses and external courses located outside a particular university in online courses. Such a model of educational programs involves the personalization of education, allowing students to receive unique sets of competencies in demand in the labor market. Personalization of education, in turn, consists of introducing a system of individual educational trajectories based on tutor support and personal grant support, as well as amendments to relevant regulatory legal acts. Instead of the existing rigid division between institutes (faculties) and areas of preparation, it will create a single educational space in the university.

Such organization of the educational process gives greater freedom of choice, which at the first stage can cause difficulties in navigating various educational environments. To date, some leading universities already have experience in eliminating these difficulties. Based on the association Global Universities, universities created a website of methodological support. The largest universities assist students and teachers in organizing education in the new conditions[14].

The concept of a single educational space updates the peer-to-peer communication model: Horizontal network learning contributes to developing communities of students capable of research and innovation.

Another aspect of the activity that contributes to the creation of a single educational space is the functionalization of academic levels by the revision of the structure of educational programs according to the 2 + 2 model with the possibility of clarifying the direction of education after the second year in a way that preserves student's budget funding.

For a student to effectively build an individual educational trajectory, the functions of different education levels must be clearly defined and not duplicate each other. The first two years of study are necessary undergraduate studies, after which the student should have the opportunity to change his specialization and even university. The bachelor's course involves a broad fundamental education, including blocks of natural science, social sciences, and humanities (Science, Technology Engineering and Mathematics and Humanities Arts & Social Sciences). The next two years of study are concentration. The function of this stage is for the student to deepen into a disciplinary and thematic area.

The primary function of the magistracy is professionalization. Universities should develop master's programs within the framework of higher professional schools, created at the intersection of theoretical and practical expertise. Research conducted at the university provides the first, and the second is provided by the professional community and associations. Vocational schools should focus on the world level of study and practice.

[13] What are we using technology to scale? // The Clayton Christensen Institute for Disruptive Innovation. URL: https://www.christenseninstitute.org/blog/what-are-we-using-technology-to-scale/ (date of reference: 07.05.2020).

[14] Методическая и правовая поддержка российских университетов при переходе на дистанционные форматы обучения // Продолжаем учиться. Продолжаем учить. URL: https://keep-learning.globaluni.ru/ (date of reference: 07.05.2020).

Proposed measures

UNIVERSITY LEVEL

Operational measures:

- increasing the proportion of classes, courses, and modules using online practices and content;

- introducing a system of payments to teachers to upgrade existing personal devices for the educational process using e-learning and remote educational technologies;

- improving the role and skills of administrative and education staff in the administration and maintenance of the educational process in an online format;

- introducing electronic services aimed at collecting feedback from students to monitor the quality of programs and their regular updating;

- using simulators and dialog simulators to personalize education;

- improving the interactivity of training courses: gameplay, scenario-based learning (SBL), using VR and AR technologies and online tools to smoothly transfer the educational process to mixed learning mode;

- organizing teaching design and teaching support services at universities (according to the Teaching & Learning Center model) to train and advise teachers on the design of educational solutions and the introduction of new technologies, and to create support elements (resources, instructions, manuals, videos, examples);

- introducing into the structure of educational programs the practices of the demonstration exam and technologies for assessing the competencies of students, including using digital tools and services;

- increasing the number of educational programs based on a modular approach, including the integration of modules from third-party universities or organizations;

- interacting with other universities to create a shared educational ecosystem, collections of open educational resources (OERs), as well as supplementing their programs with the best courses developed by other educational institutions;

- transforming the core part of the curriculum, aimed at professional competencies, into package offerings of online courses (including external developments) available to students and external students, supported methodologically at universities.

Strategic measures:

- shifting the focus from primarily classroom teaching with formal student self-work to a system of managing and supporting student self-work as a teacher, with an increase in the share of pre- and post-audience work in the network using LMS tools;

- adapting online platforms, digital educational resources, and software to mobile devices;

- transitioning to the blended learning model, which involves flexibility in the allocation of hours and forms of interaction between the teacher and the student (classroom, online/offline) in the envisaged contact work in the discipline;

- using adaptive techniques based on artificial intelligence to personalize education and improve its quality;

- developing, simultaneously with the preservation of the teacher-student model of interaction, the peer-to-peer model, which involves horizontal network learning, using new psychological mechanisms, new models of educational behavior, which are unusual for hierarchical model teacher-student;

- developing student communities for the organization of research and innovation activities, including with the involvement of representatives of third-party scientific and business organizations, educational institutions, and cultural organizations;

- developing and promoting alternative ways of assessing knowledge according to education profile;

- creating experimental educational spaces within the university for testing innovative pedagogical solutions.

FEDERAL REGULATORY LEVEL

Operational measures:

- developing methodological recommendations of the federal department on the use of third-party educational resources (including online courses) by universities, taking into account the subsequent offset of their development results;

- improving regulatory legal acts concerning the use of digital technologies in the educational process, including measures to stimulate their use, and the developing local acts regulating the use of digital technologies;

- increasing the funding for "Education of Citizens in Universities" as part of the FP "New Opportunities for Everyone" (National Project "Education") by 1 billion rubles for priority support of additional vocational education programs on mixed education;

- increasing funding for educational activities under the federal project "Development and implementation of a program for systemic support and improving the quality of life of older citizens" (National project "Demography");

- increasing the number of personal digital certificates of the federal project "Personnel for the digital economy" (National project "Digital Economy of the Russian Federation").

At the same time, it is necessary to provide for the recipients of grants the possibility of partially paying for education above the allocated grant (independently or with the participation of enterprises and organizations) and completing education under the necessary and more expensive program;

- providing grant support for universities in the design and production of open online courses and content, as well as support for universities that provide open access to their own electronic libraries and collections of online courses or content;

- providing grants to universities for the development of digital didactic support tools and new education formats in training areas that require practical skills;

- creating and supporting a regular methodological publication to promote the existing experience of universities in the use of online learning formats;

- providing support for regional competitions for university teachers in the formation of modern methodological developments;

- developing a system of "micro-degrees" (assigning "intermediate" qualifications) based on the results

of the development of individual courses (modules) and their consideration when passing the main educational programs of higher education;

Strategic measures:

- creating national online education platforms free of charge for universities, along with the possibility of using other global platforms;

- creating a program of joint financing of business in developing simulators, exercise machines, educational games, and other services for educational activity;

- establishing a system of advisory services and certification of the quality of online courses depending on their content and methodological readiness for use, as well as the developing recommendations for users;

- establishing centers of pedagogical excellence and/or professional schools of education for developing new educational methods and scaling up successful experiments;

- revising the existing normative interpretations of forms, technologies, and methods of education with greater orientation to the current infrastructure of the educational system and emergent approaches to teaching;

- organizing a federal experiment on the implementation of the 2+2 model.

- developing standards for mixed learning models, including recommendations for the integration of teacher workload activities to support students' self-employment in the electronic environment;

- supporting the creation of electronic learning management systems that allow the administration of individual educational trajectories of students;

- funding training programs for educational managers;

- removing regulatory restrictions preventing the transfer of students studying at the expense of the federal budget to other areas of education;

- transitioning from standards in the areas of preparation to standards in the aggregated groups of specialties;

- developing a mechanism for allocating budgetary places to universities for applications for which these universities do not yet have a license and/or accreditation.

4

Overcoming inequalities and improving access to quality education

Institutional and regional differentiation

The expansion of tertiary education in Russia was accompanied by a wide differentiation in the university landscape. Students from different social groups are disproportionately represented in universities that differ in the quality of education. Well-trained applicants do not always enter universities that correspond to their education level; students from low-income or poorly educated families are displaced from the tertiary education system either to the least quality universities or to the least sought-after educational programs. Thus, access to higher education levels (master's, postgraduate) is largely determined by social factors. Students of the most selective universities in Russia are more often from families with higher education, a higher socioprofessional status, and higher income.

The transition to e-learning has increased differentiation in education. Students from the most selective universities, in most cases, adapted faster to the new format, continued to study online, and were less likely to experience difficulties caused by e-learning. Students from other universities more often encountered a shift of disciplines from one semester to another semester, and the level of satisfaction with the new formats for organizing education was lower.

University heterogeneity is increased by regional heterogeneity. One of the main indicators of access to higher education is the ratio of students to the population of the relevant age cohort, 17–25 years.

Regional heterogeneity, coupled with low educational mobility, creates a differentiation in higher education access and in high-quality programs. Differences exist not only between regions but also between urban and rural areas. The coronavirus pandemic changes entry strategies and educational mobility, reinforcing interregional disparities in access to higher education. Students from families with a high socioeconomic situation are more likely to live in large cities, have more opportunities to study in their native region, or have resources to move to cities with better universities. In contrast, for students from families with lower socioeconomic situations, study at a university is associated with the need for relocation and greater relative costs. The pandemic increases the cost and risks of moving to another city due to families' deteriorating economic situations, concerns about health risks, and perceptions of e-learning formats as less valuable.

Thus, the demand for higher education will likely decrease among groups that are now least represented in universities, that is, among small cities, remote areas, and rural areas. This can lead to the closure of small universities, which traditionally serve as an anchor for such areas and subsequently to the emergence of new depressed areas that increase regional imbalances. This could lead to a decrease in social mobility and the consolidation of economic inequality in the regions, because at the same time, for students from families with a low socioeconomic situation, the pandemic increases the cost and risks of moving to another city due to the worsening economic situation of families.

In 2019, regional accessibility averaged 28 percent, with maximum coverage of 58 percent. There are 19 regions at risk, where coverage does not exceed 20 percent. These include remote regions, and several national republics. The quality of education of students in these regions varies from 0 to 85 percent[15]. In half of them, there are no highly selective universities[16].

[15] Number of places for student in the region higher education institutions of good quality is calculated as the ratio of students in the region enrolled in universities with a GPA of reception of unified state examination > 70, the total number of students in the region and describes the opportunity to study at a selective University in the region of residence. The higher this indicator, the higher the chance to enter a selective university without moving to another region.

[16] Малиновский С.С., Шибанова Е.Ю. Региональная дифференциация доступности высшего образования в России / Нац. исслед. ун-т «Высшая школа экономики», Ин-т образования. М., 2020. (Современная аналитика образования; № 13 (43)) (in print).

Digital inequality

Higher education's emergency transition to e-learning showed that to varying degrees universities and regions turned out to be ready for new circumstances. Among students, there is economic inequality in its classical meaning, and digital inequality, which is associated with both financial constraints (lack of necessary equipment and inability to acquire it) and difficulties in mastering new technologies. Simultaneously, students from less affluent families are always in a less profitable position, various types of inequality are layered on top of each other, and against the background of the pandemic and the economic crisis, they multiply negative effects.

It is noteworthy that e-learning most negatively affects the activities of practically-oriented and creative universities (medical, agrarian, transport, and cultural universities) and the functioning of most organizations of secondary vocational education that are part of universities. Electronic education is difficult to carry out when teaching physical education, as are disciplines that involve the need to perform laboratory work on special equipment, disciplines in the study of medicine, and disciplines included in education programs for creative professions. At the same time, in leading universities, the accumulated experience in the electronic mode has already led and will additionally lead in the future to significant progress in the formation and use of digital educational environments: a new level in the development of electronic learning technologies; developing the qualifications of faculty and administrative staff; the possibility of transferring correspondence students to a distance (evening) mode with an improvement in the quality of education; gradual integration of educational processes of parent universities and branches; and the development of networking among universities. It is also likely that many routine organizational and educational processes in such universities will be transferred to an online format through students' and teachers' personal offices and other services.

Socioeconomic inequality reinforces digital inequality. The least well-off students are often unable to find a convenient place to study; they often have problems with the Internet (or the Internet does not meet the requirements); and currently 20 percent of such students do not have devices suitable for distance learning. Also, less well-off students are more likely to lack access to the information programs and equipment needed for learning. Consequently, they are more likely to face additional costs when switching to distance learning. Simultaneously, 83 percent of surveyed students from the least wealthy group cannot afford to buy the missing equipment[17].

For less well-off students it is more difficult to work with online courses' interfaces; it is more difficult for them to study educational material independently. They more often note a feeling of loneliness, a lack of opportunity to discuss the material being studied with classmates, which poses potentially greater risks of underutilization of the program. They also often lack face-to-face communication with teachers; it is more difficult for them to ask questions and answer them when interacting online. They are also more often confused by the involuntary need to demonstrate to students and teachers the situation of their place of residence and study during remote communication. All these manifestations of digital inequality can contribute to a situation in which less affluent students will become less familiar with the educational program and bear the corresponding risks when taking exams and getting a job in the future.

As studies show, information asymmetries, differences in skills and skills in working with information, are crucial factors in inequality's secondary effects. The expansion of digitalization of admission procedures, including those on the principle of forming a "one window" for educational navigation resources and the provision of information on student support opportunities and widely available interfaces for obtaining comparative information about universities, will not only help reduce negative effects for risk groups but also equalize educational trajectories in the long term.

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[17] Here and further, unless otherwise indicated, the analysis is based on the data of a survey of students conducted by the HSE and TSU on behalf of the Ministry of Science and Higher Education.

Student employment and job loss

From 2012 to 2018, the number of state universities decreased from 630 to 500, and nonstate from 266[18] to 445. The decrease was most pronounced in the branch network and distance learning programs, which resulted in lower access to higher education for the working population, which is more linked to territory.

The current absence of a full replacement for lost opportunities has transfered families living in small towns, rural areas, and remote areas to the current risk group. The economic effects of the coronavirus pandemic further limit the ability to combine professional activities and education. The pandemic and associated restrictions has also affected the employment of students, many of whom had full or part-time jobs and provided for themselves financially during their studies. The closure of enterprises and the transition to remote work affected their employment schedule and wages.

Figure 1 provides information on student employment in February and May 2020, according to the level of security of the student's family. There has been a decline in the employment rate across all groups by an average of 3 percentage points in just three months. There has been a shift in employment patterns toward more odd and part-time jobs, especially for students from less affluent groups. The percentage of students who had part-time employment outside the university has also decreased. Part-time work allows students to combine their studies at a university with the ability to support themselves financially. Changes that began to occur in the economy have reduced students' chances of employment, which may ultimately affect their higher education involvement as a whole. According to various estimates of sample studies, about half are forced to combine work and education due to lack of money. At the same time, students involved in the service sector and auxiliary positions in offices are most at risk.

In response to the coronavirus pandemic, many universities promptly launched a student employment promotion program, with positive results. According to surveys[19], there was an increase in the proportion of students employed in universities. The growth was not large, but given the program's short duration, it can be considered effective. The employment of students creates an additional channel of their support against the background of a decrease in demand for labor in mass segments of the labor market, and it also involves students in the decision-making process at the university, to form a proactive position towards the university and develop practical skills.

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[18] Абалмасова Е.С. и др. Университеты на перепутье: высшее образование в России / общ. ред.: Д.П. Платонова, Я.И. Кузьминов, И.Д. Фрумин; науч. ред. Я.И. Кузьминов, И.Д. Фрумин. М., 2019.

[19] The survey of students conducted by the HSE and TSU on behalf of the Ministry of Science and Higher Education.

29%
of students had paid jobs in February 2020*

5%
lost their jobs by June due to the epidemiological situation

23%
believe that employment opportunities have become fewer

About 19 percent of working students noted a delay in paying salaries, 40 percent of students lost income (out of 3,523 respondents).

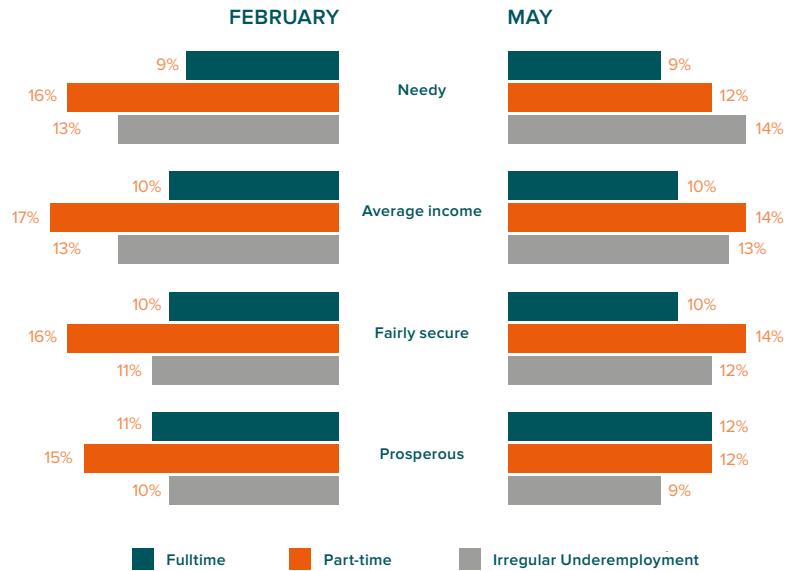** 19,627 students participated in the survey*

FEBRUARY   **MAY**

Needy
February: 9% (Fulltime), 16% (Part-time), 13% (Irregular Underemployment)
May: 9% (Fulltime), 12% (Part-time), 14% (Irregular Underemployment)

Average income
February: 10% (Fulltime), 17% (Part-time), 13% (Irregular Underemployment)
May: 10% (Fulltime), 14% (Part-time), 13% (Irregular Underemployment)

Fairly secure
February: 10% (Fulltime), 16% (Part-time), 11% (Irregular Underemployment)
May: 10% (Fulltime), 14% (Part-time), 12% (Irregular Underemployment)

Prosperous
February: 11% (Fulltime), 15% (Part-time), 10% (Irregular Underemployment)
May: 12% (Fulltime), 12% (Part-time), 9% (Irregular Underemployment)

■ Fulltime ■ Part-time ■ Irregular Underemployment

Fig. 1. Employment of students in spring 2020 depending on the level of economic security of their families

Differentiating the quality of e-learning

As noted above, teachers and administration of various universities and training areas were prepared differently to transition to e-learning. For example, students in the fields of arts and culture, natural sciences, and engineering are less likely to note that all classes were transferred to a new format; students of these specialties more often face the transfer of disciplines to the next semester. In principle, education programs for doctors, teachers, and engineering personnel are difficult to translate into a new format. Mathematics, economics, management, and social sciences were best prepared for the original format. Thus, studen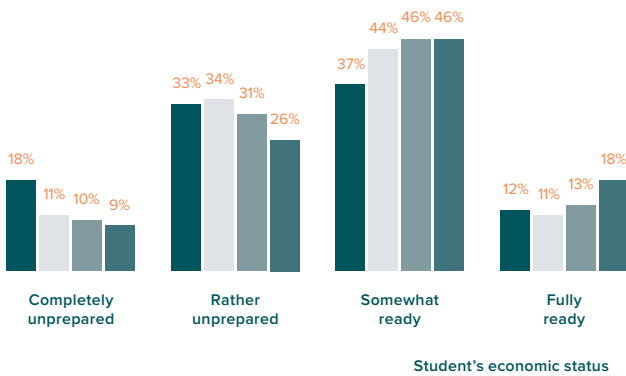ts in different education areas in various universities received other opportunities to finish the spring semester. This creates another structural risk—the gap between employment and education, the imbalance in education among sectors, and the lack of qualified personnel in the budget sector and of personnel for high-tech production.

The digital infrastructure of universities was also to varying degrees suitable for the transition to e-learning: universities use LMS and cloud-based data storage services to varying degrees; they have different opportunities, for example, to hold several online events at once.

11 percent of universities had high availability of infrastructure[20]

[20] Шторм первых недель: как высшее образование шагнуло в реальность пандемии / А.В. Клягин и др.; Нац. исслед. ун-т «Высшая школа экономики», Ин-т образования. М., 2020. (Современная аналитика образования; № 6 (36)).

Students in leading universities are more often satisfied with the quality of e-learning, and students at other universities more often note problems when switching to a new format. The relative situation of students from low-income families who are more dissatisfied with e-learning has deteriorated (Figure 2).

How ready were your university and your teachers for an emergency transition to a remote education format?

How satisfied are you with the distance learning organization in your university?
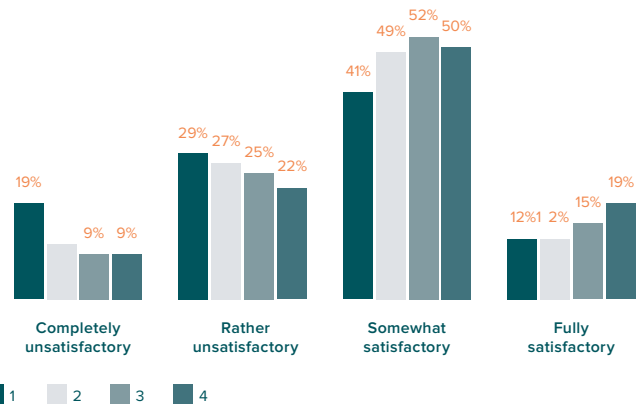

Student's economic status: 1 2 3 4

Fig. 2. Students' assessment of e-learning quality

Financial accessibility of higher education

The population's financial opportunities during the pandemic decreased; some students faced both inability to pay for their studies and difficulties in terms of employment and occupation. The pandemic may impose additional restrictions on students from less affluent families whose chances of entering a university are lower: first, on families' willingness to spend money on preparation for admission to a university, and second, on families' desire to invest in education to the detriment of earnings, from the fact that a potential student will lose because he or she will study. Although the pandemic has increased the risks of unemployment, the next trouble arises: Young people who have not entered

universities or secondary vocational education institutions may not find work, which may also lead to increased unemployment. Thus, university students who are forced to leave school, graduates who have not found a job in the crisis, and school graduates from the least wealthy families who have not entered universities fall into the risk zone.

Less well-off students are twice as likely to note that their classmates left their studies to provide for themselves or their family. An explanation may be that less affluent students study in less selective universities, so that their classmates are also more likely to represent less wealthy families and may experi-

ence the same financial difficulties. One in 10 students says that their fellow students had to drop out, which is a very alarming sign, because before the coronavirus pandemic, Russia was among the countries with a relatively low dropout rate. Still, now the situation is changing (Figure 3). Simultaneously, given the rather stringent institutional conditions of educational trajectories, the termination of education de facto preserves the model of failure and often means the actual impossibility of raising their academic level in the future.

Tuition fees are a significant cost item for students. On average, the cost of tuition can be about 40 percent of per capita income[21]. **80 percent of students note that their classmates who study for a fee expect difficulties paying for their studies.**

In this regard, the following precedents from universities' experience in other countries draw attention: providing technology[22] to low-income students and providing free access for low-income households by some Internet service providers[23] (one company temporarily provides its services free of charge to everyone)[24]. There are examples of such practices in Russia: TSU paid the Internet for all students living in university dormitories[25]. Another positive example is the Far Eastern Federal University, where IT volunteers help students with Internet access[26].

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[21] Малиновский С.С., Шибанова Е.Ю. Региональная дифференциация доступности высшего образования в России / Нац. исслед. ун-т «Высшая школа экономики», Ин-т образования. М., 2020. (Современная аналитика образования; № 13 (43)) (in print).

[22] https://bit.ly/2RQ8j3h

[23] https://abc11.tv/3aoj96P

[24] https://comca.st/2VsSFgy

[25] https://bit.ly/34QDOQ2

[26] volunteers help students with Internet access

Are there any cases in the course where students were forced to drop out to provide for themselves and/or their families to compensate for the lack of funds for living? (percent)
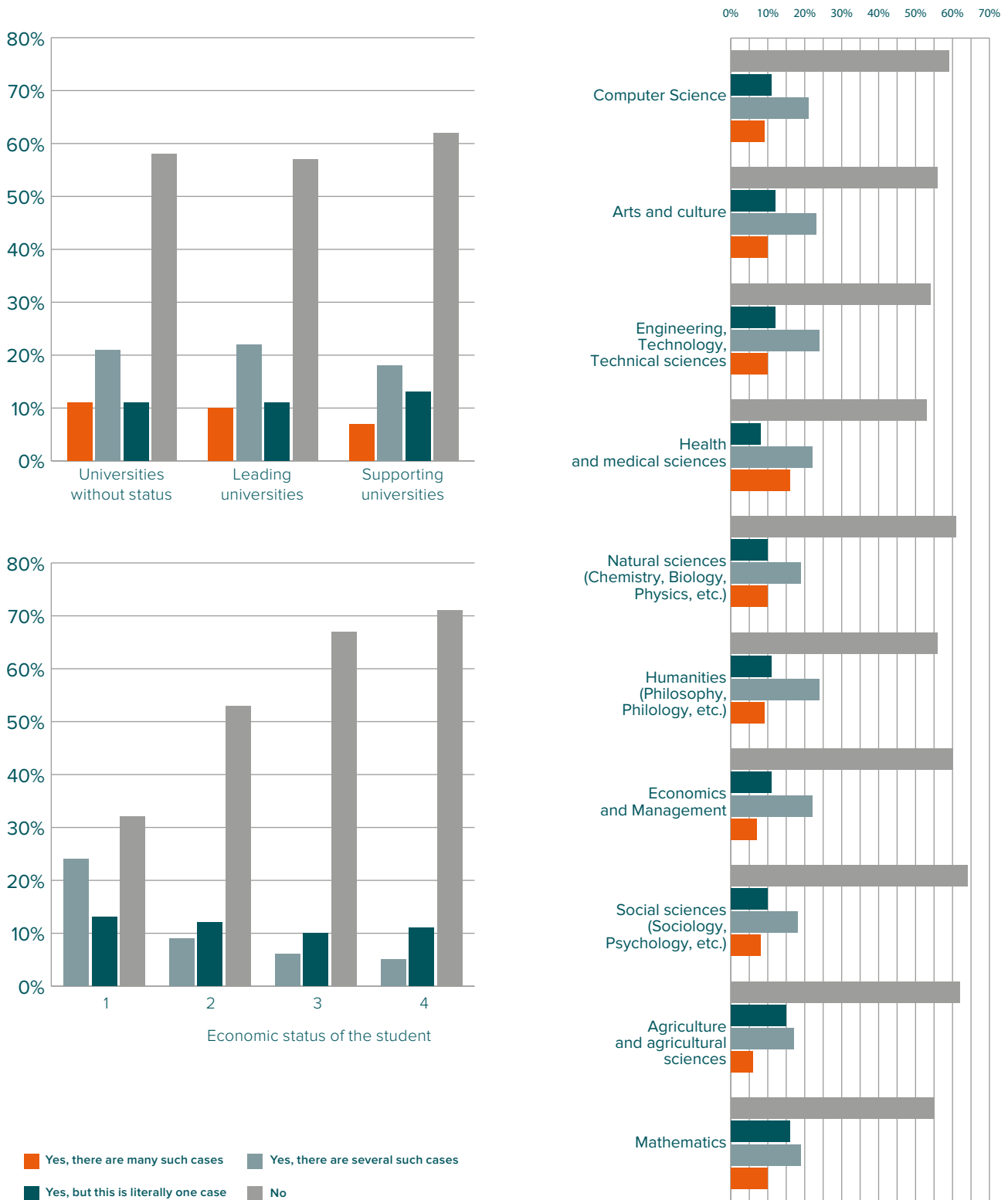

Economic status of the student

Legend:
- Yes, there are many such cases
- Yes, there are several such cases
- Yes, but this is literally one case
- No

Fig. 3. Results of Student Survey on Termination in Pandemic Settings

Changing educational trajectories after the coronavirus pandemic

The pandemic can adversely affect students' involvement in higher education in groups with different levels of socioeconomic status. Even before the epidemiological situation worsened, inequality manifested itself in educational transitions and continued to grow. Most schoolchildren from less affluent families leave school after graduating from 9th grade, thereby bypassing the most common way to enter the university, graduating from high school and passing the exam. Two-thirds of those who finish 11th grade are children from families where at least one parent has higher education. While higher education has traditionally been the privilege of the most affluent and educated families, this trend has only intensified in recent years. Representatives of low-income groups of the population are being washed out of the tertiary education system. The gradual concentration of children from less-educated families on educational trajectories with lower social and economic returns leads to social stratification throughout the education system. For each subsequent generation, the possibility of academic mobility is reduced. It is possible to increase educational mobility and create productive role models with grants and places for first-generation students to receive higher education.

The pandemic can reinforce these trends. School graduates and students adjust their plans. Students are less likely to continue their studies in the magistracy. Graduates of schools with low socioeconomic conditions, facing uncertainty and impending crisis, may prefer shorter-term education in professional institutions and entry into the labor market. Also, students from low-income families are more likely to leave school and work during the pandemic. It increases the disproportionate distribution of educational opportunities for students of different social backgrounds.

The new lifestyle caused adjustments to students' plans and to an even greater extent their educational trajectory.

43 percent of students changed their plans to enter master's / postgraduate studies or continue their studies abroad[27].

Students' professional plans have also changed: now they are less likely to declare their readiness to work in their specialty or the desire to go to work abroad, and less likely to open a business or undergo unpaid internships. In the pandemic, only the most affluent students still declare their readiness to open their business. Less wealthy students became less inclined to pursue a career in the same city where they studied.

[27] The survey of students conducted by the HSE and TSU on behalf of the Ministry of Science and Higher Education.

Proposed measures

The problems noted above carry the potential risks of reducing the population's level of education and competencies, and the loss of human capital.

Simultaneously, the forced transition to e-learning can open up new opportunities to reduce the problems of unequal educational

opportunities. Universities had to increase or strengthen competencies in using electronic technologies, including increasing the share of educational content suitable for the online format, purchasing library resources, creating their online courses, or adapting materials from other universities.

The new competencies of teachers and administrative staff are themselves a valuable development resource. Along with this, network interaction opportunities have expanded: the formation of consortia, the development of new network programs, and the updating of forms and content of educational and scientific activities. New formats, together with new competencies, contribute to the formation of new organizational models. The development of new models of organizing educational and scientific activities and the use of new formats of interaction between students, applicants, and teaching staff became possible.

The rapid development of culture and basic practices of using digital tools and the formation of new digital content create opportunities to reduce inequalities access to resources access. First of all (if the necessary equipment is available), chances are expanded for applicants from remote areas and those who cannot provide education for students with disabilities. Such conditions create a window of opportunity for regional universities to attract more applicants and contribute to equalizing knowledge according to the regional principle.

The new education format may be a second chance for those who, for one reason or another, have not received higher education earlier but now need a more flexible regimen for continuing their studies. Content diversity creates competition for the best products, which means it contributes to increasing the availability of high-quality higher education.

E-education can develop individualized educational trajectories that are not tied to formal structures and regions and serve to create adaptive learning tools. Individualization can help compensate for differences in student cultural capital and reduce the secondary effects of inequality, including those due to differences in family cultural capital.

The transfer of education to the electronic mode is also the digitization of educational trajectories and educational results to form a legitimate metric for assessing skills and competencies. The analysis of individual metrics will make it possible to evaluate achievements objectively, improve signals for labor markets, and reduce the differentiation associated with universities' status and the primary and secondary factors of access inequality that arise from assessments based only on meritocratic principles.

Finally, the electronic learning format involves new models of interaction between those already involved in higher education and the creation of new spaces for electronic career guidance and educational navigation, by informing and consulting applicants based on data. Such an approach can increase the correspondence of academic results to educational trajectories.

To resolve these problems and take advantage of new opportunities, what is needed is:

1. Retention of students in the higher education system who find themselves in difficult life circumstances, increasing the representation of the population's most socially vulnerable groups.

First, solutions in this direction should be focused on reducing the immediate effects of inequality (i.e., related to the unequal distribution of educational resources among families), support for those who find themselves

in the most challenging life situations due to the virus and its economic consequences, increased accessibility for students from the least represented groups in the higher education system, targeted assistance to needy students, and increased opportunities to combine professional and educational activities.

2. Reducing loss of human capital by the equalization of educational opportunities, improving the overall level of quality of education in universities.

The most critical decisions have been taken promptly to eliminate the most acute social risks at the state level. Leveling differences in educational quality and raising awareness of choice of educational trajectories were not different priorities, making them only relevant at the current stage. The crucial type of solution is to inform students about opportunities, increase the correspondence of abilities and educational opportunities, reach out to students about the most relevant and most profitable educational trajectories for them, promote the suitable choice of educational trajectories, provide career guidance, develop new education formats, expand opportunities for academic courses, and end all types of secondary effects of inequality, including digital inequality.

3. Equalization of the quality of higher education in the context of the country and universities.

Critical decisions in this direction should be focused on developing opportunities for access to education in third-choice universities, equalizing the quality of education, reducing regional imbalances in the distribution of human capital, and increasing the financial accessibility of education.

UNIVERSITY LEVEL

Operational measures:

- creating jobs in universities for students who have lost their jobs, including by introducing project work modules and offsetting educational units;

- providing targeted subsidies for the purchase of digital education funds for students from low-income families;

- monitoring students at risk of dropping out;

- developing and offering adaptation courses for certain categories of students, introducing programs for developing learning competencies in the digital environment;

- expanding the supply of digital educational content together with leading universities;

- preferentially providing dormitories to applicants from low-income families;

- transferring for temporary use the university's information infrastructure to needy students;

- modernizing the scholarship tool, which involves the redistribution of scholarship and material assistance funds to support the most at-risk groups of students;

Strategic measures:

- establishing points of excellence (honor programs) in regional universities of the average level of selectivity: It is necessary to form the quality educational programs offered that correspond to the potential of applicants in the region, especially the most trained;

- introducing increased social scholarships for students deprived of family support;

- introducing tuition discounts for successful students based on social background;

- targeting support for students from low-income families through the expansion of university funds for material assistance, charity;

- forming an analytical system in universities that ensures targeted support;

- implementing digital risk forecasting tools;

- organizing special support for students at risk;

- developing flexible tuition systems, including deferral of fees;

- implementing a procedure for interrupting the educational process and restoring the completed courses with retention of the seat.

- developing digital complexes of adaptive education, taking into account the individual characteristics of students;

- expanding the network of pre-universities/zero faculties, preparatory courses based in leading regional universities;

- introducing adaptation courses for master's students who are graduates of third-choice universities.

FEDERAL REGULATORY LEVEL

Operational measures:

- developing a methodology for identifying students in need of social support;

- national monitoring of educational trajectories of students from low-income population groups and high-risk groups (including student dropout monitoring to identify factors leading to school interruption);

- distributing admission benchmarks, taking into account the role of universities in ensuring access to higher education for the population of remote regions and small towns; targeted grants to universities to work with students in a difficult situation;

- establishing counseling services for graduates of different levels of education, explaining the possibilities of study and social support in leading universities;

- providing targeted subsidies for the purchase of digital education

- or higher-speed Internet rates for students from low-income families;

- reducing the costs of receipt procedures and the costs of obtaining information by maximizing the translation of most educational selection navigation procedures and submitting applications in a remote electronic format;

- providing centralized free access to educational information resources, centralized support for connection to leading library resources of universities that do not have a corresponding opportunity;

- granting funds to universities to develop digital didactics support tools and new education formats in educational areas that require practical skills (medicine, culture, some technical areas).

Strategic measures:

- introducing an increasing ratio of normative funding for all cost groups, depending on the representation of certain social groups in the university;

- allocating additional admission control figures (or quotas) for students from low-income groups of the population in case of a slight lack of pass points;

- analyzing the need to organize a national examination system for admission to masters and postgraduate studies of leading universities;

- developing a pool of quality computer-adapted tools to assess university-level basic subject knowledge to maintain a basic level of quality;

- creating the possibility of transfer to leading universities for strong students;

- transforming the model of correspondence education (longer contact time with the teacher/tutor, strengthening online components, extension of the term of education, design of educational trajectories);

- creating an open national university accredited for issuing state-type diplomas: bachelors education in the distance and distributed format, reduced entrance requirements for admission, founders are leading universities with technology companies;

- continuing the program to support the employment of students in universities in 2020–2021;

- extending the target reception; modernizing the targeted admission model, including additional state subsidies, the possibility for employers to pay for education mainly in senior courses of study, and supplementing educational credit opportunities; expanding

targeted admission to masters and postgraduate studies; expansion of targeted admission for low-income applicants with a slight lack of points;

- introducing grants for first-generation high school graduates (children of parents without higher education);

- expanding the educational credit program with incentives for the participation of low-income groups in the higher education system (through differentiation of interest rates, an extended period of return, reduction of the rate upon successful completion of studies, automatic simplified tax deduction);

- inclusion of support for social mobility in the system of assessing universities' activities (additional targeted grants in case of reaching increased thresholds: the share of students from rural areas, nonurban students, low-income students).

5

Implementation of new approaches to research and innovation

Limitations for scientific collaborations

Research has faced new-old challenges, which manifest themselves primarily in the disruption of scientific communication forms that have become familiar both in the international and the Russian dimensions.

The bulk of current science results are achieved in scientists' collective work from different organizations and countries.

Over the past decades, Russian universities and scientific organizations have made significant progress in collaboration: Joint scientific laboratories and large-scale research projects, attracting leading scientists from other countries to full and partial employment, authoring joint publications, and holding authoritative conferences have become the norm of research protocol. Many forms of scientific interaction cannot be fully realized under restrictions on movement.

Limitations in experimental and technical development are becoming equally problematic. In a standard research process, access

to equipment involves researchers' physical presence and support staff in buildings where other educational and research teams also work. Moreover, research teams often consist of representatives of various organizations, and the implementation of the experiment requires work on several sites. It is evident that such experimental activity in self-isolation conditions becomes extraordinarily problematic and threatens others' health. Also, because of the economic impact of the coronavirus pandemic, the market for technology projects funded by real-world enterprises is shrinking, owing to their financial difficulties. There is a need for measures to rebuild the market.

The following Russian features and deficits reinforce the global deterioration of communications and the gaps in experimental activity processes.

Funding

The lack of long-term funding sources for research is particularly acute in universities where government research assignments are insufficient. This deprives them of a great deal, from planning capabilities to the time maneuver much needed in the new circumstances. As a result, the risk of outflow of scientific personnel, combined with the inability to attract authoritative researchers from the outside in a situation of uncertainty, increases.

In this area, the equalization of funding conditions for academic institutes and universities is seen as useful, because it will lead to the opportunity to develop existing scientific schools and create new ones due to the availability of stable scientific rates of pay both for young researchers and those raised in the university and/or invited leaders of scientific areas, principal investigators, (PI). Simultaneously, it is possible to predict a significant increase in the number and quality of scientific publications in universities and, accordingly, an increase in the position of leading universities in Russia in international rankings. That is, such measures provide outstanding support for the international academic reputation of Russian higher education.

Long-term targeted funding from a state task or special grants is also required to solve the problem of attracting Russian and other young scientists on an ongoing basis to universities who already have experience in independent, and often international, scientific activities, for example, in postdoc positions offered on a competitive basis.

As part of such a project, it would be possible to employ the best young scientists from among those who defended their dissertations at the university, thereby reducing the labor market burden.

Fragmentation and spatial distribution

Highly regional distribution, combined with the lack of infrastructure and financial support for medium- and long-term internal Russian academic mobility, including official housing, is a severe obstacle to Russian science. The result will be a long period of renewed academic mobility after the pandemic. A strong fragmentation of scientific competencies and the separation of laboratory infrastructure between individual universities and academic and sectoral institutions are also present. Steep organizational barriers in the use of research infrastructure, even within one subject of the federation, lead to scientific groups' encapsulation and the consolidation of their role as a local performer.

Despite some re-establishment of cooperative relations between research organizations and universities and the establishment of joint laboratories and collective use centers, mutual access to the research infrastructure remains limited by the established administrative barriers between organizations, which prevent the effective use of the developed infrastructure and also limits the reproduction of research personnel through the mass involvement of students in research activities. **In this situation, it is advisable to raise the question of creating integrated regional scientific centers.**

Narrow specialization of scientific groups

The world-class scientific competencies maintained and developed in the current period in research organizations and universities, as a rule, are incredibly narrow, while overcoming scientific and technological challenges requires the implementation of large-scale projects of an interdisciplinary nature. Also, academic institutions often have substantial gaps in basic research, and leading universities are more accustomed to working in the market of competitive scientific money, including in the real sector of the economy.

It is necessary to raise the question of pilot projects for the legal integration of individual universities and academic institutions, as a rule, as regional scientific centers with the preservation (or increase for additional interest in the project) of their existing funding from the state allocation on science.

From the point of view of support with regulatory documents, this issue needs to be

worked out at the regulator's level. With the correct selection of unifying institutions, the university significantly grows its international scientific and academic reputation, scientific projects become more interdisciplinary, and the united structure's potential is more suitable for extensive scientific and technical work with business interests. Such a system can ensure more effective use of scientific equipment and more effective reproduction of scientific personnel through students' mass involvement in scientific activities.

When creating such centers, it is possible to place structural scientific units in separate buildings or rooms with a separate entrance, capable of working autonomously, communicating with administrative services online, which would make it possible to work autonomously in a difficult epidemiological situation.

Need for support collective use centers

Some types of scientific equipment and scientific research concentrated in collective use centers allow remote access services to scientific and scientific-educational organizations within Russia. Such centers require special attention from the regulator and priority financial support in the pandemic context. It is also possible to create a network of collective use centers, which will allow joint research, including international research, to be carried out online. Funding should be directed to support such projects.

For example, in activities of the working group of the BRICS countries for astronomy, as a result of multilateral discussions on the flagman project of interest to all five countries, the project offered by Russia was chosen: BRICS Intelligent Telescope Network (intellectual network of the telescopes of BRICS). This year, the working group plans to send a request to the BRICS Bank and its governments to support such a project. It would be correct to support this request. Such a project will enable BRICS scientists to work in a single network, naturally, remotely, regardless of the epidemiological situation in a particular country.

Lack of digitalization of research work (R&D)

Encapsulation and localization are also facilitated by the insufficient introduction of R&D digitalization tools and network scientific interaction, including limiting the practice of using world electronic libraries and knowledge bases, online interaction, and insufficient openness of scientific results of leading research centers.

Already, most conferences, study, and thematic workshops of scientists are held electronically. Moreover, online seminars gather many times more participants than fulltime ones. This type of scientific communication, which needs to be developed in the future, even after the end of epidemiological restrictions, will increase its openness and speed of communication and ensure more participants' inclusion.

In this framework, it is necessary to develop systems of a single national subscription (for at least 100–120 leading universities) for digital resources used in research activities, not only for full-text databases of publications but also for analytical products that will be available to researchers and teachers, postgraduate students, and university students. At the same time, it is essential to develop and implement a system for real monitoring of their use, which will give a clear idea of the whole situation with the development of the university's research activities.

The current crisis has demonstrated how many computational resources are used to conduct scientific research on advanced scientific and technological frontiers. It has become clear how important it is for researchers to have access from anywhere to the computing power needed to conduct basic and applied scientific research, including those carried out in the interests of the real sector of the economy.

In intensifying network scientific interaction, it is essential to introduce, for leading universities that will receive state support to increase their competitiveness under the Strategic Academic Leadership Program (primarily for national research and national reference universities), requirements for disclosure in a standardized machine-readable format of personalized research results, educational, innovative, and technological activities of all employees and students of each university, information on the material and technical basis for conducting scientific research, which could be made available on a single portal for disclosing the activities of leading universities with advanced search capabilities on given research topics, keywords, equipment used, and the like in Russian and English. This will significantly facilitate access and the level of trust by economic agents, potential partners from among Russian and other universities, and scientific organizations, state authorities, and local governments.

To increase the number of high-quality scientific publications (Q1 and Q2 in international rankings), it is necessary to develop and improve the level of the Russian scientific journals. This is possible with a significant expansion of state support for Russian scientific journals, including attracting leading international and Russian scientists to the editorial boards.

Lack of funds from scientific foundations and other sources for joint grants

The insufficient share of scientific funds and other public funding sources allocated to support projects based on domestic and international scientific cooperation leads to an inadequate number of domestic and international scientific partnerships.

A successful example is the existing regional scientific and educational mathematical centers, created, as a rule, based on several organizations, in particular the Ural NOMC, made based on the Institute of Mathematics and Mechanics of the Ural Branch of the Russian Academy of Sciences, Ural Federal University, and Izhevsk State University.

To develop the interaction of scientific collectives and organizations within the country, it is advisable to consider a new type of grant, which could be awarded on a competitive basis to two or more organizations for a joint research project. At the same time, each of the organizations, possibly located in different Russian cities, would receive its share of the grant from implementing the general project, stimulating network scientific interaction.

For the development of international scientific ties, bilateral grants from Russian funds—the Russian Scientific Fund and the Russian Foundation for Basic Research—with foreign funds are useful, but there are very few of them; a ten-fold increase in the sustainable international partnerships of Russian scientific teams and the number of winning grants is needed. After the implementation of such projects, cooperation between groups of different countries continues for many years.

Another direction in support of Russian universities, for participants in the consortia of universities that won the Horizon-2020 programs of the European Union and the new Horizon-Euro program, is the financing in almost all Russian universities of such a project, which has not yet occurred. The Russian university, having taken on certain obligations at the international level, did not receive sup-

port from the Ministry of Education and Science. Participation in such consortia does not require traveling to each other; research can be carried out autonomously, complementing each other, which is also possible in a situation of force majeure such as the current pandemic. This is an effective way to engage in European scientific cooperation even under self-isolation conditions during a pandemic. Due to the negative economic consequences of the coronavirus pandemic, which compresses the market for technological projects at the expense of enterprises in the real sector of the economy, it is necessary to continue developing R&D financing programs for enterprises.

The problem of scientific personnel

Finally, perhaps the most critical circumstance that most affects the prospects of Russian science is the weakened material, financial, and organizational support and system of training scientific personnel, involving young people in scientific research, and supporting the career of a researcher. This increases the risks of outflow of young scientific personnel, creates an additional burden on the labor market.

To solve these problems, it is necessary to actively and purposefully involve students and graduate students in conducting scientific activities and continue developing the system of dissertation councils of universities.

First, it is essential to introduce competitive schemes of material support for graduate students of leading universities studying at the expense of the federal budget in priority areas, with a scholarship size comparable to the average wage in the economy or higher. At the same time, control figures for admission to graduate school at the expense of the federal budget should be allocated primarily to universities with healthy scientific schools and, possibly, to specific scientific schools and research projects that correspond to state scientific and technological priorities policy.

It is advisable to make it the norm to involve first graduate students and then undergraduates of leading universities in conducting scientific research, not for the sake of writing qualification work, but to gain experience in working as part of scientific groups on research projects funded by the budget system of the Russian Federation or at the expense of enterprises in the real sector of the economy.

The use of topical research publications should be integrated into master's and postgraduate programs while reducing textbooks. Postgraduate and master's students should be aware of relevant scientific research in their subject area, and critical subjects studied. Over time, this will inevitably lead to a qualitative improvement in the qualifications of professors.

A normative framework should be developed for a cross-cutting postgraduate program, as is the practice in some countries. Applicants who have determined that they are following the scientific track, entering the master's degree should have a guaranteed opportunity to become graduate students subsequently. This will increase the effectiveness of graduate school (in the sense of defending a candidate dissertation). It is evident that the through-program of postgraduate studies should not be the only form of master's studies, but should be only one of the possible trajectories.

It is essential to continue expanding the range of universities with the right to award academic degrees in the dissertation councils they created independently. In those universities that have already received this right, the

requirements for the defense of dissertations are usually higher than in the dissertation councils of the Higher Attestation Commission because their reputation is significant for such universities, including for the export of education. It is not surprising that a substantial proportion of those defending dissertations are foreign citizens at these universities. To summarize the existing practice, it is necessary to expand it to more universities.

Proposed measures

Thus, changes in research organization in higher education should affect several areas: financing, digitalization, domestic and international scientific cooperation, infrastructure, and education.

Currently, the Concept of Scientific and Technological Cooperation of Russia and the Deputy Prime Minister of the Russian Federation T. A. Golikova, dated February 8, 2019, has been prepared and agreed with all necessary structures; four ministries have been instructed to ensure its implementation. Also, the Development Plan of the cooperation in the areas of science and technology of Russia is now in preparation (until 2024 and for a further period until 2035). Emphasis should be placed on this plan by the proposals in this section of the present report.

UNIVERSITY LEVEL

Operational measures:

- transition of conferences and thematic seminars of scientists to online mode;

- separation of structural scientific divisions in separate buildings or blocks with a separate entrance, capable of working autonomously, communicating with administrative services online, would make it possible to work autonomously in a difficult epidemiological situation.

Strategic measures:

- introducing the requirement to disclose in a standardized machine-readable form personalized results of research, educational, and innovative technological activities on a single portal of information on the activities of leading universities;

- creating permanent scientific positions that ensure the continuity of the development of scientific schools, the independence of the scientific plan, and the sustainability of the university's development.

FEDERAL REGULATORY LEVEL

Operational measures:

- changing the concept of the Decree of the Government of the Russian Federation of April 9, 2010, No. 220 on the possibility of online project management by a foreign scientist;

- introducing competitive schemes of material support for graduate students studying at the expense of the federal budget in priority areas, with the size of the scholarship comparable to the average level of wages in the economy or higher;

- providing universities with access by researchers through national subscriptions not only to full-text databases of international publications but also to analytical products;

- resuming the creation (at the expense of the state task and/or special grants) of permanent scientific positions for leading scientists and Russian and foreign postdocs, ensuring the continuity of the development of scientific schools, the independence of the scientific plan, and the sustainability of the development of the university;

- introducing measures to stimulate the R&D market in the interests of enterprises (expansion of financing of programs in line with Decree of the Government of the Russian Federation of April 9, 2010, No. 218, tax incentives to enterprises bearing R&D expenses);

- development of requirements for disclosure in a standardized machine-readable form of personalized research results, educational, and innovative technological activities on a single portal for disclosure of information about the activities of leading universities.

Strategic measures:

- introducing long-term (5 years or more) and sustainable continuous (January to December) basic scientific funding for basic research at leading universities;

- allocating funds for the competitive part of the state task for the implementation of joint scientific projects of universities and institutes of the Academy of Sciences with the allocation of funding simultaneously to two institutions, possibly in the form of a joint (mirror) laboratory or consortium;

- introducing a new type of grants to the Russian Science Foundation and the Russian Foundation for Basic Research; such charges on a competitive basis

will be allocated to two or more organizations (university + academic institute, university + university, institute + institute) for a joint research project. At the same time, each of the organizations, possibly located in different cities of Russia, receives its share of the grant for the implementation of the general project;

- increasing the share of funding allocated to bilateral grants with foreign funds by the Russian Science Foundation and the Russian Foundation for Basic Research funds with an increase in the number of licenses;

- supporting Russian universities of participants in consortia of universities that won the Horizon-2020 programs of the European Union and the new Horizon-Euro program;

- developing a unified national subscription system for digital resources used in research activities (including analytical products), with the introduction of a method for monitoring the movement of practical research and students to assess the development of processes of involvement in research activities;

- considering the possibility of creating integrated regional scientific centers (university and academic institutes);

- establishing a federal network of supercomputing centers that provide computing power at the request of researchers and research teams;

- establishing network shared use centers, which will allow joint research, including international research, to be carried out online;

- expanding the program of state support of Russian scientific journals to increase their international ranking;

- extensively funding the academic mobility support program, both at home and abroad, including virtual mobility;

- developing the system of independent awarding of academic degrees by leading universities;

- identifying postgraduate admission benchmarks, taking into account the existence of specific scientific schools and research projects consistent with the priorities of the State science and technology policy;

- developing a normative framework for a cross-cutting postgraduate program;

- including topical research publications in master's and postgraduate programs while reducing the use of textbooks.

6

Challenges and Directions for Upgrading Digital Higher Education Infrastructure

Noncompliance of the digital infrastructure of educational organizations with e-learning requirements

During the transition of universities to distance learning, the problem of incomplete compliance of the organization's digital infrastructure with working conditions in a virtual environment was especially clearly highlighted. Most of the universities' IT budgets were spent on maintaining and updating the fleet of devices of Russian universities, which includes about 1 million personal computers, of which about 650 thousand are used in the educational process, as well as 90 thousand interactive boards and projectors[28]. This equipment must be completely updated within 5–7 years.

At the same time, it was this infrastructure, in which fixed assets were invested for years, which was practically not in demand in the transition to distance learning.

A survey[29] of 29 university rectors showed that unprepared digital infrastructure is a key issue for most universities.

At the same time, it is important to review the priorities in the purchase of equipment and develop a digital infrastructure that will enable

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[28] Summary of "ВПО-2" data for 2019.

[29] Survey of rectors of Russian universities conducted in May 2020

76%

of the rectors identified the need to develop the physical and service digital infrastructure of universities.

organizing education in a digital environment effectively. In the future, it will be possible to reduce the requirements for the mass provision of education with computer equipment (computer classes). Universities' needs can be effectively ensured by moving to use of students' and teachers' personal devices. The priority for universities should be the development of wireless high-speed Internet access channels.

Lack of basic data storage and transmission infrastructure

The key elements of the physical digital infrastructure of the university in remote working conditions are data storage and processing systems, as well as telecommunications systems that provide external access to the university's resources and allow users on campus, for example, living in a dormitory, to access Internet resources.

Currently, about 40 percent of universities (Figure 4, "low" and "below average" groups) have insufficiently performing Internet access channels and may experience serious difficulties in organizing distance learning.

Universities from the secondary group may encounter difficulties if a large amount of media content is placed on their resources. Most universities from the above average and high groups have the opportunity to provide their internal educational process. Still, if students from other universities are connected to their courses, they may also face difficulties.

Most universities have the potential for a small amount of growth. During the transition to remote work, many of them used these capabilities and increased the speed of their connection to the Internet. Simultaneously, the possibility of increasing channel productivity is limited by the capabilities of
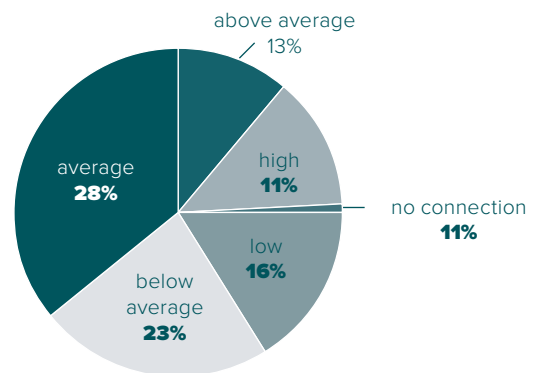

Fig. 4. Performance of Internet connection channels, share of universities

communication equipment used at the university. Multiplying access channel performance will require a major upgrade.

It should also be noted that about 25 percent of universities have connections to internal city networks (peer-to-peer networks), which enables them to provide communication with students and employees living in the city where the main campus of the university is located without using the main Internet access channel.

The second most important element of the digital infrastructure was storage and storage (storage) systems, which are used to host

digital platforms and services, student and teacher data, and digital educational content, the number of which has grown many times during the distance learning period.

At the time of transition to remote work, 21 percent of universities did not have their own data storage and processing systems (Figure 5). Another 23 percent of universities had ultra-small storage systems. Thus, 44 percent of universities did not have the opportunity to deploy full-fledged LMS and other complex information systems throughout the organization on their information resources. Another 24 percent (mid-storage group) may encounter mass scale placement difficulties in their media content systems.

Universities with large storage and super-large storage have the ability to host heavy content containing a large number of video materials. However, opening online courses to students at other universities will require multiple in-
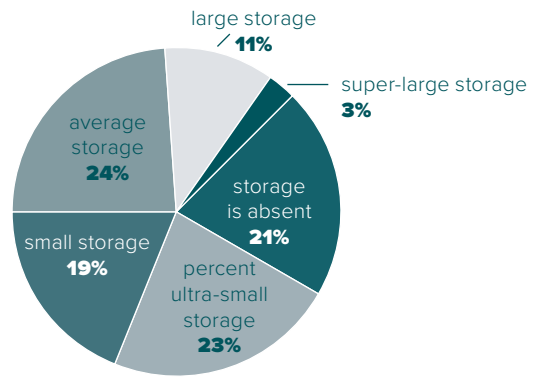
Fig. 5. Storage availability and total storage capacity, share of universities

creases in the resources used. This opportunity is available only to universities with a low degree of load (16 universities).

Solving the problems of ensuring high-speed Internet access and secure storage and processing of data should become a priority for developing the physical digital infrastructure of universities.

Educational Management Platforms and Services

In the the transition to a remote form of education, the issue of the availability of modern tools for organizing educational activities in the digital environment became acute.

Student surveys showed that in more than half of universities there were serious difficulties in organizing educational activities that were associated with the lack of adequate digital tools.

The experience of remote work showed that the presence of a working system for managing the educational process and working together became a key factor in the successful transition of the university's activities to distance learning.

During the monitoring of digital infrastructure, more than 88 percent of universities announced that they have LMS platforms. However, an analysis of the performance indicators of digital platforms showed that only 45 percent of universities actually use LMS platforms for organizing educational activities throughout the organization. In other cases, there is either the formal presence of the system or the fragmented or experimental use of LMS platforms.

The clear leader among LMS in Russian universities is the freely distributed Moodle platform. More than 82 percent of universities use this solution. This correlates well enough with strong professional communities to use

15%

of universities had no means of communication with students

this solution and major competencies to implement Moodle in several universities.

Along with classic LMS platforms, the functionality of which enables organizing the educational process in a remote form, some universities use general-purpose communication platforms for organizing individual elements of distance learning, as well as digital services that enable recording student participation in various educational and noneducational activities, such as an electronic portfolio. In fact, there is the possibility of partial implementation of distance learning at these universities.

At the same time, the experience of leading Russian and international universities shows that the effective implementation of distance learning requires fundamentally new solutions and platforms, such as integrated EMS systems (Education Management System) and Virtual Learning Environment (VLE) with a wide functionality that provides a variety of interactions and services in the virtual educational environment of the university and its integration with the university campus, as well as in the educational process and extracurricular activities implemented in the physical environment.

Synchronous learning platforms in a virtual environment

During universities' distance work, the most common way of organizing the educational process was synchronous education using video conferencing services (VCS) and webinars. More than 90 percent of teachers in the survey noted that they used VCS systems to conduct classes.

An analysis of Russian universities' service infrastructure showed that at the time of the transition to remote operation of the VCS system and webinars, only 15 percent of universities were not using it. 72 percent used various cloud services, 56 percent used systems deployed on university resources (Figure 6).

Simultaneously, over 50 percent of the systems deployed on the university's resources, and about 30 percent of cloud services used by universities, had a limit of no more than ten online events in parallel and were used for one-time events, because of the restrictions of the software product used or the selected tariff if the university operates an external online service. Such systems enable carrying out management activities in a virtual environment but do not fully implement online education.

The analysis showed that only about 44 percent of universities had solutions that made it possible to hold more than 50 online events in parallel and massively organize synchronous education in a distance format.

In the transition to distance learning, universities' strategies to provide teachers with access to VKS platforms were manifested. In terms of universities, there is a centralized provision of access for scientific and practical work by scaling the solutions already used, acquiring subscriptions to new products.
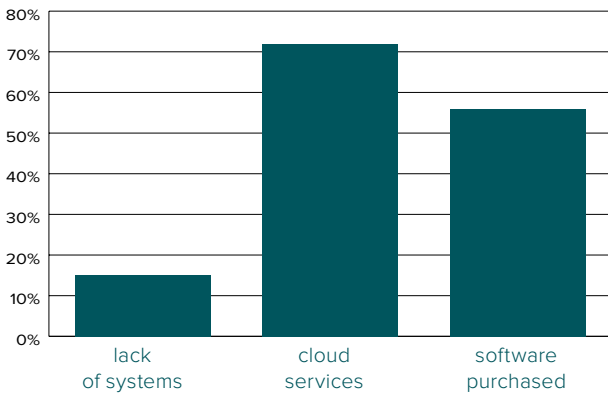
Fig. 6. Availability of videoconferencing systems (VCS) and webinars in universities, the share of universities

Most universities left the choice of platforms at the discretion of teachers, as a result of which they actively used free versions of video conferencing services. The most popular service was Zoom.

Due to the lack of integration with universities' information systems and the use of external communication channels for sending invitations, the relevance of information security issues has increased significantly: Numerous cases of external interventions and disruption of online classes have been observed.

Provision of students and teachers with digital devices, software, and Internet access

A vital element of the digital infrastructure of distance learning was the workplace of students and teachers in their place of residence. For successful distance learning, the student and teacher must have a personal digital device (personal computer, laptop, or tablet) with the necessary software (software), as well as high-speed Internet access.

According to surveys, 7 percent of students did not have in their personal use the equipment necessary for learning during the period of distance learning. The proportion of students who have at their disposal a technique that meets the functional requirements for e-learning is 50 percent in leading universities and only 43 percent in universities without status. 68 percent of them note that they do not have the opportunity to improve the device's quality or purchase a new one that meets all the requirements. Only 1 percent of the respondents said that they use the university's equipment for personal use; another 2 percent replied that during the transition to distance learning, they used university equipment in the university building.

A survey of scientific and pedagogical workers[30] showed that more than 80 percent of teachers were provided with equipment at the time of switching to a remote format of work and education insufficient volume: 45 percent declared the presence of all the necessary equipment and 37 percent the presence of most of the equipment. In the future, their number increased. At the time of the survey, about 90 percent were provided with enough equipment.

The proportion of teachers who do not have the necessary equipment for distance learning organization was 5 percent at the transition to the remote format of work. In the future, it decreased to 3 percent.

Only 52 percent of students have access to all the software they need to learn, 34 percent have available more than half of what they need, but not all, 13 percent have available less than half, and 2 percent do not have available any of the programs they need to learn. When asked about the purchase of paid

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[30] Based on the results of a survey of scientific and pedagogical workers.

programs, applications, and distance learning services, 91 percent of students answered negatively.

Thus, students are not sufficiently provided with programs for full-fledged study. Only half of the students have access to all the necessary software; one-third have available no more than half of the essential software. The situation is slightly better in leading universities compared to supporting universities or universities without status.

At the same time, the need for software varies depending on the discipline. The situation is better than the average in the computer and social sciences (including in economics and management) areas, and the humanities. Groups of areas at risk are military sciences, art and culture, pedagogical sciences, and agriculture. Some students compensated for the lack of software by purchasing licenses for their funds—among students of areas at risk, from 8 percent (agricultural sciences) to 16 percent (military sciences).

As for the compliance of Internet connection with the requirements for distance learning in the place of residence, only 33 percent of students indicated full compliance, 44 percent answered "rather meets," 18 percent "rather does not correspond," and 5 percent "does not correspond at all."[31]

Thus, although almost all students can access the Internet, many note the presence of problems with its quality. One in five students does not have a stable and high-quality Internet access at home that meets the requirements of distance learning, and only one-third are fully satisfied with the quality of the Internet. At the same time, students from low-income families mainly experience problems.

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[31] Survey of students of Russian universities on the conditions of distance learning.

Particular attention should be paid to ensuring access to the Internet for students and teachers living in educational organizations' dormitories. According to the monitoring of universities' infrastructure, 89 percent of the Russian Federation's dormitories are connected to the Internet, in which 96 percent of the total number of residents use it. 9.63 percent of hostels are not connected to the Internet; this figure itself seems quite significant, but only 1.75 percent of the total number of students live in them.

In more than half of university dormitories (56 percent), third-party organizations offer Internet access services. Significantly, many of these universities do not have information about the quality of connection of them to the Internet.

It should be noted that universities tried to quickly solve the problems of providing students and teachers with digital devices and access to the Internet during the period of distance learning. Still, system solutions are required in this direction. An example is the experience of National Research Technological University "Moscow Institute of Steel and Alloys". Their dormitories are provided with the Internet through subsidies allocated by the Moscow government to provide free wi-fi services in student dormitories of universities in the capital.

Thus, we can distinguish several problems in the field of the digital infrastructure of universities, which create severe difficulties for the implementation of e-learning and in general negatively affect the competitiveness of Russian education:

◼ insufficient availability of individual devices and Internet access for students and research;
◼ insufficient performance of Internet access channels and lack of readiness of the

network infrastructure of universities for high loads;

▤ unresolved information security issues;

▤ systematic challenges to information security;

▤ lack of readiness of university management information systems for increased dimension and complexity of tasks;

▤ poverty and underdevelopment of the system products and services market for learning management.

⚙ *Proposed measures*

To successfully modernize the physical, service, and information infrastructure of universities, it is necessary to ensure the following set of measures.

UNIVERSITY LEVEL

Operational measures:

▤ rapidly scale, increase productivity of, and introduce into the educational process information systems and services (LMS systems, systems for organizing VCS and teamwork) already available in universities, but operating in separate units or test mode;

▤ connect universities that do not have educational process management systems, video conferencing services, and/or teamwork platforms to relevant cloud services and integrate them with existing information systems;

▤ use cloud-based data storage and processing services in universities that do not have their infrastructure, as well as with insufficient storage and information processing resources;

▤ provide methodological and targeted resource support for teachers and staff in the staffing of individual technological infrastructure;

▤ create higher efficiency of Internet access channels.

Strategic measures:

▤ rethink investments in the digital infrastructure of universities: reject mass provision of the educational process with computer equipment (computers in classes), the transition to

the concept of using personal devices of students, and the formation of a system of targeted support for students who are not able to purchase personal devices;

- develop the university's network infrastructure, organize high-speed wireless networks (wi-fi), expand communication channels, provide network security;

- create a single window of access to digital services and university resources, including remote access to physical equipment or mathematical models;

- audit existing university infrastructure, including the physical space of the university, for efficient use and cost optimization; launch in-university programs to manage and transform existing campus processes and spaces; reconfigure the internal space of the university, creating a motivating environment;

- develop university proctoring systems.

FEDERAL REGULATORY LEVEL

Operational measures:

- form a list of digital services and solutions recommended by the Ministry of Education and Science of Russia for organizing higher education, including LMS systems and video conferencing systems, develop requirements for the functionality and quality of their work, verify and ensure the safe integration of services into the infrastructure of universities;

- audit the digital infrastructure of universities, the availability and current state of automation of fundamental processes, determining the basic level of digitalization that all organizations of higher education should comply with, and offer targeted support for universities that do not have the necessary digital infrastructure, to achieve a basic level of digitalization.

Strategic measures:

- support university collaboration and development of competence centers for the digital transformation of universities to disseminate better experience, form collective systems of recommendations, and evaluate the quality of services; optimize costs through the creation of common infrastructure elements, services, and the purchase of collective licenses;

- support the development of modern system products and services that provide integrated management of educational organizations through the unification of the efforts of universities and technology companies;

- guarantee at the technological level the protection and confidentiality of data of universities that will use global services or federal platforms;

- nonlocalize global services; transition to a contractual basis with international and federal benefits.

- support creating digital services and solutions (for example, in proctoring for the remote conduct of exams, specialized exams for admission to universities, exams during training, final exams and VCR, defense of master's dissertations in private mode).

7

Management team deficits and guidelines for improving the university management model

The current crisis demonstrated that many management teams of universities were not ready for a situation of work in conditions of uncertainty: Some made ambiguous and contradictory decisions, others took a wait-and-see position, relying on instructions from the regulator, one-third sought to transfer activities to a remote mode but faced a lack of digital competencies and skills to develop and implement crisis measures.

The challenge of managerial professionalism

In 2018–2019, 48 percent of senior staff of educational organizations of higher education underwent advanced training, while two-thirds was for programs on the use of information and communication technologies or education in the profile of personnel's pedagogical activities[32]. However, management staff receives almost no specialized education in the field of management of higher education. Simultaneously, the professionalism of management teams, their ability to see opportunities in difficult situations, quickly navigate a changing environment, design complex solutions, and find nonstan-

[32] Индикаторы образования: 2020 : стат. Сб. / Н.В. Бондаренко, Д.Р. Бородина, Л.М. Гохберг и др.; Нац. исслед. ун-т «Высшая школа экономики». М., 2020. С. 315.

dard ways depend on the well-being and efficiency of the entire higher education system. The lack of readiness of management teams to work in conditions of uncertainty, which has now become constant, leads to the inability of the Russian higher education system to quickly respond to global challenges, which poses a severe threat and, in turn, affects the pace of scientific and technological development and the socioeconomic, demographic, and political situation in the country.

The inconsistency of traditional management schemes with the realities of the modern world signals the need to review the system of training and appointment of managerial personnel and the structure of the university management system as a whole. Also, in favor of the latter thesis are **factors caused by the transformation of universities' role in society and global trends in higher education.**

1. Increasing the autonomy of universities and the diversity of stakeholders.
The state, large businesses, and the local community want to see a full-fledged partner in the university, and university management teams should act in this capacity. Managers and teams are required who are capable of independently forming a vision and acting autonomously, not waiting for instructions from the outside but taking into account stakeholders' interests.

2. Request for flexibility in decision-making and adaptability.
Continuous changes are now constant. Under the influence of global trends and the environment of continuous changes, senior managers' portfolio of competencies is continuously changing. For managers at all levels, the ability to objectively assess the situation, perceive changes in real-time, predict their consequences, adapt, and sometimes, rebuild right on the go, holding the strategic vector of the organization's development and the picture of the future. 70 percent of top Russian managers noted that

in the next five years, the essential skill of a high-level manager would be the ability to see opportunities in a complex, uncertain environment; another 50 percent of respondents noted the importance of high skills for learning, developing vision, and uniting people around this vision, plus a combination of flexibility and the ability to keep focus[33].

3. Competent manager profile and modern type of organization.
The experience and skills of the management team should be relevant to the university model. Depending on this model (for example, a research university, an innovation university), a management team with appropriate experience in such organizations or experience in long-term partnership with them and having the necessary competence should be nominated for managerial positions.

4. Increased mobility of management personnel.
Management inbreeding leads to rigidity of thinking and slowing down the increase in the professional skills of specialists. University management practices should be revitalized by an active exchange of experience, including increasing the mobility of academic leaders and borrowing expertise from other areas. The circulation of original approaches and thoughts in higher education can be favorably influenced by building a career portfolio[34] that includes a long list of implemented projects in various organizations.

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[33] Будущее управленческих профессий: форсайт-исследование, июль-сентябрь 2019 г. // Центр научно-технологического прогнозирования ИСИЭЗ НИУ ВШЭ. URL: https://amr.ru/files/Forum_future_of_management.pdf

[34] Portfolio career may refer to: 1) several part-time jobs at the same time (managing and participating in several projects, combining positions, working in councils, committees, international organizations); 2) several consecutive permanent jobs (usually in project mode in related industries or in similar positions). In both cases, the process of gaining experience in implementing various projects, developing unique professional expertise and changing the environment is fundamental.

5. Multitasking role of the university. The university is a multi-institute and occupies multiple positions in different contexts: a regional development institute, an expertise and research center, an educational organization, a participant in the chain of knowledge-intensive and innovative production. The leadership should be able to set the university's target positions in the system of division of labor at the regional, national, and global levels, maintain a promising role in the educational, research, innovative, and academic markets, and at the same time always find new niches for inclusion and development.

6. Distributed leadership. The complexity of the university's organization and the multiplication of the duties of administrators require a change in the usual paradigm of management and the distribution of functions. This design of distributed leadership can be built according to the example of large companies' supreme power, where the CEO is the rector, and the supervisory or trustee board becomes the managing board, which performs the functions of the board of directors.

The distribution of functions, in this case, may look like this: the rector is responsible for organizing the work on the formation of a vision and the development and implementation of a university development strategy with the involvement of key employees, and is engaged in operational management. Also, the rector's responsibility includes taking into account the interests of all university stakeholders, building relations with them, and coordinating the management team's work. The governing council is responsible for choosing a leader (rector) for a specific stage of university development, forming requirements and criteria for selecting candidates, evaluating the leader's work, and accepting and verifying the practicality and feasibility of the development strategy developed by this leader. Members of the gov-

erning council also work to attract additional resources (financial, material, intangible, administrative, expert, political, etc.) and lobbying interests, and publicly protect the university's positions. The management team, including vice-rectors, directors of institutes, and heads of critical areas, focuses on implementing the strategy developed, searching for new points of development, and ensure the organization's stable functioning.

To install a distributed leadership system, several organizational and regulatory measures are undoubtedly required, as well as resources for the corresponding changes.

1. Rector

First, changes are needed in the established form of the institution of rectorship. At the moment, the rector's role is most often perceived as organizational and economic, with the main task of ensuring the organization's stable functioning.

New times require the rector to have a long-term vision. This strategy ensures the achievement of the goals set in the university's current situation, and an understanding of the landscape and dynamics of the development of the Russian and world market for science and higher education.

First, it is necessary to adjust the definition of the rector's functions and separate the areas of responsibility with the governing council. The tasks of the rector should be:
▪ **organizing work on the creation of vision, development, and implementation of**

university development strategy with the involvement of the key staff;
■ **controlling operational management;**
■ **taking into account the interests of all stakeholders of the university and building relationships with them.**

The rector's competency profile and views should be relevant to the development of a particular university and adequate time. Often, the current situation dictates the existence of specific experience gained in areas outside the academic field and, in some cases, outside the country. A review of the criteria for selecting candidates for the post of rector is necessary, which will expand the pool of candidates to include specialists with successful management experience outside the academic world. In particular, revising the mandatory requirement for the rector to have a title and a degree is required: This will make it possible to attract the best personnel with relevant professional experience from other activity areas. The list of selection criteria should include the requirement of fluency in English, should take into account not only the knowledge of teaching or research but also the experience of innovative or entrepreneurial activities, participation in international projects, successful attraction of financial resources, and interaction with stakeholders at the level of leadership of large corporations, regions, federal ministries and departments, and global network organizations.

Responsibility for the search and development of a set of criteria for candidates for the post of rector, taking into account the university's current situation, should be borne by the governing council, possibly with professional involvement of recruiters (HR specialists) in the search.

Change of the head of an organization often occurs due to a crisis and, as a result, the need for fundamental changes in the activities of the organization. Due to the inertia of social ties, the organization's staff is rarely able to independently make the necessary changes and separate the university's goals as a whole from their own professional and personal interests. The system for appointing rectors should be changed, by the introduction of a mechanism for appointing rectors on the governing council's recommendation. The evaluation of candidates should be comprehensive and include assessing work experience in various areas, a portfolio, and a responsible public assessment of skills and competencies.

Low mobility of managerial personnel characterizes the Russian academic market. In the sphere of higher education, a full-fledged need for administrative personnel should be formed, characterized by:
■ **entry barriers (skill level, reputation capital) and competition;**
■ **high level of rotation and mobility of personnel;**
■ **understandable principles of wage formation and working conditions;**
■ **variability of career trajectories;**
■ **existence of a mechanism for identifying and promoting the most competent specialists, market principles for the transition between posts and positions;**
■ **existence of institutes of development of the market (recruitment agencies, professional associations, expert analytical centers) and training and development programs.**

The assignment system and mobility principles must be transparent and understandable to all academic market participants. For this, a unified database of rectors and leaders of higher levels should be created, which will increase personnel mobility and create a full-fledged system of selection of managerial personnel for higher education organizations. This base should be open to the govern-

ing councils of universities and used by them as sources of information for the search for candidates for the rector's position. The base should include a detailed competency profile of the manager, an analysis of his or her activities and results, and recommendations on the types of universities and the types of situations and problems that a particular rector will best cope with.

At the moment, there are almost no mechanisms for an objective assessment of the activities and competence of the rector, except for the proper fulfillment by the university of the requirements of the ministry and the passing of the certification process, which is often perceived as a formal procedure that does not fundamentally affect the development of the university. Professional development remains the rector's business, and the competence of the rector's corps is preserved due to the community's closeness and the lack of external development incentives.

Evaluation of the rector's activities should be carried out regarding the university's development and the implementation of the strategy. All those who participate in the life of the university in one way or another should take part in the assessment of activities: the governing council, the government commission, the professional community, and all groups of stakeholders of the university (representatives of regional authorities, students and faculty, industrial partners).

An integral part of the university management system's work should be annual public reports on the results of the work, which are presented by the rector and the management team. At the same time, all groups of stakeholders, including students, partners, and representatives of the professional community, should have the opportunity to attend the event, get acquainted with the materials, and ask direct questions. The performance

assessment results should be reviewed by the management board and taken into account by the rector and the management team.

Another growth point is the lack of systematic education and advanced education of university heads and formalism in professional development issues. At the moment, the advanced training programs that are prescribed for rectors[35] include only the areas of state and municipal administration, personnel management, project management, management, and economics. Rectors must undergo training that maximally meets the tasks facing them and acquire the skills that are urgently needed in the university's specific current situation. It is necessary to build a modern management training system and training of persons holding or planning to take up a rector position. Training programs must address strategic planning, team management, financial management and fundraising, building relationships with many stakeholders, and other crucial areas.

Rectors' qualifications at the university cannot be completely improved at the individual university they direct. The organization's supreme head cannot get new managerial competencies and expand their horizons within their organization.

2. Governing Council

Supervisory and guardianship councils in current practice are limited in power and cannot fully realize the potential of participating in the university's strategic management. The need for distributed management,

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[35] Об утверждении Единого квалификационного справочника должностей руководителей, специалистов и служащих : приказ Министерства здравоохранения и социального развития РФ от 11.01.2011 № 1н. Разд. «Квалификационные характеристики должностей руководителей и специалистов высшего профессионального и дополнительного образования».

presence in the direction of higher education institutions of various competencies, and examination derives from the management board's role and functions: The governing council has to be a governing body that integrates all university positions.

As mentioned above, the tasks of the governing council are:
- **selection of a leader for a specific stage of university development, the formation of requirements and criteria for selection of candidates;**
- **evaluation of the rector's work;**
- **testing the feasibility and feasibility of the development strategy developed by the leader (rector);**
- **attracting additional resources (financial, material, intangible, administrative, expert, political);**
- **lobbying for interests and public protection of university positions.**

The governing council should have powers to influence rectors' appointment: The charter of the university should contain a norm that the rector can be appointed only from among the candidates proposed by the governing council.

Also, the governing council must evaluate the rector's activities and initiate decisions regarding the contract based on the results of this assessment, including submitting proposals to the founder of the university on the early termination of the rector's powers in case of an unsatisfactory work evaluation.

The governing council, as a rule, meets in full force 4-5 times a year. It is recommended that the governing council publicly present not only the final decisions but also their justification. At least once a year, one of the meetings can be devoted to expanded communication with the academic community.

The authorities' most productive cooperation with the university's leadership can develop if the governing council's interaction and the founder of the university are based on partnership rights in the mode of consultations, mutual recommendations, and joint solution of problems.

Such a structure's functioning should not be carried out unpaid; it implies a high degree of responsibility and personal involvement of the council members, choosing whom should be approached with special attention.

Thus, the governing boards' structure should be according to a board of directors model.

Often in universities at the managerial level, different categories of interests are insufficiently represented. Also, universities urgently need to look from the outside, the expertise and understanding of the current structure and principles of various industries, businesses, and alternative scientific and educational systems.

The composition of the governing council should be heterogeneous in terms of competencies, professional and scientific backstory, and industry interests. Council members should have experience in thinking and making decisions at the regional, national, and global levels. Participants should hold positions, maintain independence of judgment, discuss problems, and propose solutions on an equal footing. A unique experience, extraordinary achievements, and expertise in their professional sphere are essential.

The diverse backstory of the governing council members may not allow understanding of the specific problems and management characteristics of higher education.

The new management practice and model of university management will need educational and expert support to popularize the approach, increasing the attractiveness of cooperation with universities in the eyes of representatives of business, science, international organizations, and the state.

Additionally, continuous work will be required to analyze results and improve the new management model's functioning and design. Both short-term training programs should be created to prepare council members for the performance of their duties and platforms for reflection and exchange of experience. Training programs should have two focuses: strategic management of the university and the specifics of the governing councils' work (for example, board of trustees). The exchange of experience between the governing councils of different universities can be organized in thematic associations and specialized events—forums, conferences, and professional seminars.

Also fundamental is a built-in mechanism for updating the composition of the council. This will reduce the governing council's risks of becoming a clannish group supporting the status quo and the body's loss of the function of change. Such a mechanism involves limiting the term of work of council members at a moral level. The duration of one term of service as a member of the council is from 3 to 6 years, while the maximum number of stay in the council is no more than three. The board's composition should be updated gradually; at least one-third of the council should change every 3–4 years.

3. Management team

As a rule, university management teams perceive themselves as an administrative apparatus that performs an exclusively performance function. From this position, it is impossible to deal with crisis management and development issues; the rector becomes the only figure responsible for the university's strategy. The management team includes vice-rectors, directors of institutes, and heads of critical areas of the university.

Management team tasks:
- **implementation of the strategy;**
- **ensuring the functioning of the organization;**
- **initiating new projects, improvements, changes, finding new growth points.**

The work of the university's management team should be based on the principles of the distribution of powers and general responsibility for the result, including the right to make financial decisions. The excessive formalism of the mechanisms of interaction between the team and the rector should be removed, which will reduce transaction costs, including those due to the hierarchism of relations and social position, which, in turn, will increase the quality and speed of decision making.

A separate team, such as a project office, a transformation office, or a crisis headquarters, can be formed to solve individual development tasks, implement transformation projects, or to develop urgent crisis measures, which can operate in parallel with the central management team, including entering into constructive contradictions with it. Full-time staff can be involved in such groups as well as outside specialists as consultants, experts, or temporary employees.

Universities often face problems of lack of new ideas and alternative views, obsolescence of expertise, and lack of understanding of the current external environment. In many ways, these problems are because the nearest circle of the rector often includes people who have been working at the university for many years and have grown up professionally together. To avoid these problems, it is necessary to include specialists with experience outside the university, including from a nonacademic environment, in management teams. When selecting candidates for the management team, it is necessary to outline the range of tasks and functions that should be implemented and the set of competencies that the group should have. A multistage selection system should also be organized, involving searching for candidates both inside and outside the university. Candidates for joining the management team of the university should have first-class expertise in various fields, because team members will be responsible for entire work areas and, in this sense, will be the support of the rector. The management team members should be also characterized by flexibility of thinking, initiative, independence, the ability to avoid conflicts of interest, and a systemic vision. As a mechanism for monitoring and motivating management personnel, it is advisable to use a system of fixed-term contracts and incentives based on individual activities.

The cornerstone of the development of the university's management potential is the preparation of a managerial personnel reserve. As a rule, staff moving to administrative positions from scientific and pedagogical personnel can learn to perform new functions but do not have the necessary additional training to work in a new role. This requires a review of the principles of management training in higher education.

Training should include:
■ **specialized management training programs in higher education and science;**
■ **internships in other educational organizations of higher education, as well as in nonuniversity structures: corporations, research organizations, in the civil service;**
■ **formal and informal exchange of experience between teams from different universities;**
■ **temporary transition to work in other universities (including in other regions) or organizations from the categories of large university stakeholders.**

Together, the personnel reserve training system should provide experience in decision-making in "combat" conditions and the opportunity to get an external view of the university's activities and develop missing competencies that cannot be acquired within the native organization.

In addition to the formation of a personnel reserve, the practice of training (learning and training of personnel) teams of managers for strategic development should be separately provided. Team members must learn to think and design the future in a single coordinated system to understand common principles and tools for working on strategic goals.

Rectors should be able to direct significant resources to ensure advanced training of personnel and training of teams; for this, it is necessary to remove restrictions on the purchase of educational services.

Proposed measures

The decision space in this area can be divided into measures that are the prerogative of the federal authorities, namely the Ministry of Science and Higher Education of the Russian Federation, and standards for implementing measures for which the autonomy and resource base of the universities themselves are sufficient.

UNIVERSITY LEVEL

Operational measures

- adjusting the definition of functions of the rector and separation of areas of responsibility with the governing council;

- increasing the role and responsibility of supervisory and guardianship councils in elective procedures for the position of the rector and initiating searches and developing a set of criteria for candidates for the post of rector, taking into account the current situation at the university;

- forming management teams capable of working on the crisis measures and strategy of the university, including

the transfer to them of the right to make financial decisions;

- giving management team members authority and relative autonomy in their area of responsibility, including the right to make financial decisions;

- including in management teams specialists with experience outside the university, including from a nonacademic environment;

- implementing fixed-term contracts for management personnel and individual performance incentives.

Strategic measures

- involving a wide range of stakeholders in the process of evaluating the rector's activities and transforming the certification procedure using modern HR practices of assessing competencies and staff development;

- creating a structure of governing boards operating according to the model of boards of directors;

- ensuring heterogeneous composition of the governing council, including representatives of all stakeholders;

- preparing a pool of managers at the organizational level;

- organizing internships for university managers and exchange sites;

- creating special programs of conceptual support for members of the governing councils and applicants for this position.

FEDERAL REGULATORY LEVEL

Operational measures

- removing restrictions on the types of advanced training programs that are currently prescribed for rectors;

- introducing a ban on rectors' continuing at their original university.

Strategic measures

- implementation of a mechanism for appointing rectors on the recommendation of the governing council;

- increasing the flexibility of the selection criteria for the post of the rector and expanding the pool of candidates to include professionals with successful management experience outside the academic world;

- establishing a unified management personnel base and transparent management rotation rules;

- introducing the practice of providing specialized training and advanced training programs for university managers;

- training staff of managers in higher education at the level of the whole industry;

- the rectors having the opportunity to direct significant resources to ensure advanced training of personnel and training of teams, for which the restrictions on the purchase of educational services must be lifted;

- limiting the rector's tenure to two terms, setting one term as five years.

8

Development trends of higher education network

The impact of the pandemic on higher education can be divided into systemic problems that existed earlier but were intensified by the pandemic and difficulties that arose solely because of the current pandemic.

Systemic gaps in the development of the network of higher education organizations

The historical gap in the quality and accessibility of higher education has significantly widened over the past decade. This became the flip side of the allocation and successful development of several universities: national research universities, federal universities, universities participating in the 5-100 program, and supporting universities. A set of activities in priority projects supporting the most promising academic groups also played a role. Post-Soviet transformations have affected sectoral universities' development in different ways, many of them having lost contact with relevant departments and their serious support. As a result, the evolutionary scenario of developing a network of higher education organizations led to an increase in the gap between universities. This gap is mostly regional and is exacerbated by the uneven socioeconomic

conditions in the regions, which increases the long-term risks for the sustainable socioeconomic development of the constituent entities of the Russian Federation. To ignore the accelerating stratification in the higher education system means to accept the long-term growth of the gap both in the quality of life and in the socioeconomic development of various regions of the country.

The outflow of applicants as a factor of systemic stratification

An essential consequence of the stratification of the higher education system is the increasing unidirectional movement of talented applicants to several regions due to the impossibility of obtaining an education consistent with their ambitions in their province of residence.

Currently, in only in 16 regions is there a surplus of migration among people aged 17–19. In other areas, young people are outmigrating, averaging between 2 and 5 percent of the total population of that age (Figure 7).

An additional factor reinforcing stratification is the existing system of distribution of budget places. The standard of control figures for admission of 800 homes per 10 thousand population aged 17–30 is considered at the national level. However, in 20 regions, the standard deviation in the lower direction is within 10 percent. In most areas of the Russian Federation, the number of students studying at the expense of the federal budget deviates by more than 10 percent from this standard. In addition to the total number of seats, their allocation structure is also a vital issue. For small regional universities, a significant complexity is when only a few budget places are allocated for a separate program. This situation creates conditions for the economic inefficiency of this direction. The existing system forms a regional imbalance in the number of budgetary places provided in education areas (technical, humanitarian). As

30–40%

of graduated students from remote regions go to study in other regions of the Russian Federation[36]
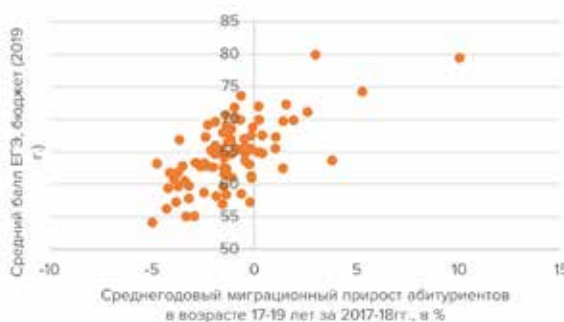

Fig. 7. Interregional migration of applicants in certain regions of Russia (with the exception of regions with a high outflow of applicants), depending on the level of prosperity of their families

a result, in some regions, the share of budget places in the field of social and human sciences reaches 45-50 percent, and in others remains at the level of 10-15 percent. Often, the regions remain almost without control numbers of enrollment in programs relevant to the region.

[36] Габдрахманов Н.К., Никифорова Н.Ю., Лешуков О.В. «От волги до Енисея…»: образовательная миграция молодежи в России // Современная аналитика образования. 2019. № 5. С. 4–42.

Digitalization experience as a factor of systemic stratification

The active transformation of leading universities allowed them to update the university, create a new infrastructure, and develop new competencies. In the context of the pandemic, that experience of digitalization has become an essential backdrop for translating education into an electronic format. At the same time, this experience was concentrated in a minimal number of universities. Almost 1,000 courses of Russian universities have already been placed on three online platforms (Open Education, Coursera, EdX). However, fewer than 20 Russian universities took part in their development, which is a result of their stratification.

Technological, competency, and digital stratification of universities against the background of the pandemic

Against the background of the pandemic, there is an increase in the gap between universities in the technological, competency, and digital fields. The coronavirus pandemic required universities to quickly adapt to new working conditions, which only a small group of universities fully succeeded in doing.

15 percent of universities did not have a working system of electronic communication with students.

This severely limited the ability to inform students at the most critical moment[37]. Even in those universities where there were such systems, students and teachers were often fuzzy about the new schedule and new requirements. Only 60 percent of universities created unique sites or sections of official sites to inform and help teachers, who were the employees needing the most significant effort to move to new work formats, the success of which largely depended on maintaining the quality of education at the proper level. At the same time, many universities have demonstrated technological and organizational lack of readiness to transition to high-quality e-learning. The proportion of teachers who could not master new educational tools at such universities reached 30 percent. In fact, they switched to a correspondence format of education with all its shortcomings; this further deepened the gap within the higher education system.

The gap also occurred in teachers' infrastructure support to provide them with working conditions in a new format.

Even among leading universities, the ability to provide high-quality electronic education in engineering and natural sciences has proven problematic. However, in regional universities, serious obstacles are obvious that physically limit the possibility of switching to electronic technologies. This is primarily access from home to practical scientific work and students' studies (technology, physical space, Internet access).

[37] Уроки «стресс-теста»: вузы в условиях пандемии и после нее: аналитический доклад. URL: https://drive.google.com/file/d/1GMcBIoP8ITzE_WDVh4nFksX6lceotZY3/view.

Such challenging situations arise in leading universities. But these universities, in advanced and systematically developing infrastructure and improving teachers' qualifications, have more opportunities to solve such problems. But for other universities in regions with an insufficient number of applicants and having outdated, redundant, and expensive infrastructure, deficient infrastructure is a constraint on their possible actions.

Thus the pandemic leads to the risk of reducing the availability of quality education, primarily in Russia's regions. The projections of rising unemployment and declining real incomes vary depending on epidemiological situation. Still, it is safe to expect a decrease in the demand for education caused by falling revenues of potential applicants' families, especially from vulnerable groups. The additional fall will be caused by the crisis programs of enterprises to reduce costs, primarily for training and R&D. As a result, the loss of extrabudgetary income will significantly complicate the situation in most universities, but this will be most painful for small regional universities that do not have a significant amount of state assignment, as well as for private universities.

The pandemic's complex challenges can lead to an even sharper stratification of the quality of education of schools and universities, between those that had the reserve and resources to adapt to work in the pandemic and those that were not ready for the crisis. This situation can lead to the consolidation of the existing stratification of education and the loss of trust in the society's educational system.

The decline in demand for education and the inability to adequately adapt to the current situation carries additional risks for small regional universities and universities in remote territories, which ensure the accessibility of

19%

of teachers had problems with the necessary work equipment. By the end of May, only one-third of these teachers had solved issues with technology

knowledge and retention of youth in the regions. In the worst-case scenario, this could destabilize the regional system of higher and additional education.

On the other hand, an active position by the Ministry of Science of Higher Education and Universities can promote a transition from a poorly interacting set of universities and academic institutions of quasi-competitors to the development of a network of higher education organizations based on new principles of cooperation, accounting for world practices and the involved participation of stakeholders to increase their contribution to regional and national development.

Some specific steps to overcome the gaps are already being taken. According to the country's leadership, the number of admission control figures is increasing, including in the regions. The new program's parameters, that is, the plan of strategic academic direction, make it possible to argue that a specific step to reduce gaps will be made at this initiative's expense. However, the above problems have been much broader and accumulated over the years; accordingly, their solutions should become part of long-term public education policy. Activities to overcome these problems can be divided into three main areas: First, overcoming digital inequality; second, increasing the availability of education in the regions and the sustainabili-

ty of the higher education network; and third, the development of academic cooperation and the involvement of stakeholders.

In addition to the necessary elimination of digital inequalties, activities that over-come these problems can be divided into two main areas: 1) increasing the accessibility of education in the regions and the stability of the higher education network; and 2) development of academic cooperation and involvement of stakeholders.

Increasing regional accessibility and sustainability of the higher education network

Solutions to improve the accessibility of education in the regions and the sustainability of the higher education network should focus on providing opportunities for quality and affordable education in a pandemic and declining income throughout the country. Long-term mechanisms will smooth the growing disparities in educational opportunities between regions.

A variety of direct and indirect forms of support (certificates for partial tuition, long-term loans with subsidized interest rates, etc.) can provide more flexibility to applicants and their families in their approaches to the issue of education and its cost. At the same time, universities need to introduce a temporary restriction on increasing the cost of paid places (partially completed, they are allowed to leave them at the level of 2019). It is also essential to support additional professional education of already-graduated specialists, including employers supporting their education.

The most critical decisions to smooth out regional inequality in general, presented at the regulator's level, are related to changes in the principles for the formation of reception control figures. It is necessary to set the minimum bar of reception control digits at 25 places in the program or field. This measure is significant for small regional universities, as it is a condition for the economic sustainability and effectiveness of education in these areas. It is also essential to increase admission control figures in subject areas with a high fee for service and high quality of programs (socioprofessional accreditation, participants in academic superiority programs), taking into account the priorities of spatial development and the existing imbalances between regions in technical and sociohumanitarian specialties. It is necessary to consider ways to retain talented applicants and young researchers in the areas (regional quota for academic certificates) in a field.

Development of academic cooperation

Solutions that ensure the development of academic cooperation and stakeholders' involvement are an essential condition for the long-term reduction of inequality between universities. Their goal in the long term is to form a new system of relations between universities, academic institutions, and local and federal stakeholders.

Today, it is essential to provide a single required minimum quality bar for electronic training formats. This is possible through the introduction of unified approaches to the formation of individual educational trajectories, taking into account the specifics of the organization of the educational process in each region and university with the methodolog-

ical support of leading regional universities, including the rules for organizing production and training practices, conducting laboratory and practical work using equipment, and running control measures. Another critical aspect of operational solutions is the optimization of the financial burden on regional universities through expanding the possibilities for sharing property (single campuses, data storage and processing centers, communications infrastructure), conducting an audit of the state of property of regional universities, and advising on the crisis management of problem universities.

In the long term, more flexibility in the development of educational activities for many universities will be provided by providing regulatory and organizational conditions for implementing applied undergraduate programs and piloting formats of accelerated education in regional universities, such as mini-degrees.

More cooperation with local stakeholders will allow taking into account local requests for higher education. Here, legislative opportunities are needed to expand the participation of local stakeholders in the university's management and support. Such participation includes ensuring the possibility of cofinancing universities of federal subordination from regional budgets and budgets of sectoral programs, transferring local innovation infrastructure to universities, and other measures.

It is also essential to expand and implement programs (interregional and intraregional) and partnerships of universities (scientific institutions) by creating educational and research platforms capable of implementing world-class network educational programs, including in interdisciplinary economic development areas. To disseminate established competencies, it is essential to create a single base of benchmarks and best practices for

developing universities (PPP internships and short-term advanced training, including remote ones, network programs, and methodological support).

For the successful development of the types of cooperation under consideration, it is essential to formulate a policy for the development of Russia's regional education system and educational development programs in each region with the involvement of the ministry, the provincial government, the leading regional university, and local stakeholders. Such a systematic approach to simultaneously assess the prospects for the development of education at the level of Russia and individual regions will give a comprehensive picture of possible areas of product and form models for the development of universities. In some of the most problematic cases, a direct policy of unification and integration of universities within the region may be necessary. It is also possible to form regional scientific and educational clusters, where leading and supporting universities will act as the nucleus. Leading universities can provide other cluster participants with a technological platform, a methodological base, and organizational solutions for providing quality education (including private universities, organizations of additional vocational education, senior classes of general education schools). These solutions will accelerate the establishment of regional resource centers, providing access to laboratory and practical equipment and methodological support both online and offline.

Critical decisions in this area can be made at the federal level.

Proposed measures

FEDERAL REGULATORY LEVEL

Operational measures:

- speedy launching of student support programs and research to purchase computer technology and provide home access to the Internet;

- translating into the online format the programs of critical importance for the functioning of the military-industrial complex, heavy industry;

- sharing best practices in digitalization and digital transformation;

- expanding direct and indirect forms of support for obtaining paid higher education (certificates for partial tuition, long-term loans with a subsidized interest rate, and others);

- supporting additional vocational education of already-graduated specialists, including through support for their training by employers;

- taking unified approaches to forming individual educational trajectories, taking into account the specifics of the organization of the educational process in each region and university, with methodological support from leading regional universities;

- optimizing the financial burden on regional universities by expanding the ability to share property (single campuses, data storage, and processing centers, communication infrastructure), conducting an audit of the state of property of regional universities, and advising problem universities on crisis management.

Strategic measures:

- developing digital solutions and technologies (exercise machines, simulators, etc.) and ensuring access to them by the regional universities and scientific institutes;

- accelerating the creation of accessible digital infrastructure (national platforms for digital educational resources, proctoring systems, electronic libraries) necessary to maintain a high-quality remote educational process, including through the implementation of the national project Digital Economy;

- establishing nationwide digital platforms for interaction with stakeholders;

- increasing admission control figures in subject areas with high paid recruitment and high quality of programs (social and professional accreditation, participants in academic superiority programs), taking into account spatial development priorities and existing disparities between regions in terms of technical and social and humanitarian specialties;

- forming mechanisms to retain some talented applicants and young researchers in the regions (regional quota for academic certificates);

- providing regulatory and organizational conditions for applied undergraduate programs and piloting formats of accelerated training in regional universities, mini-degrees;

- creating legislative opportunities for increasing the participation of local stakeholders in the management and support of the university (ensuring the possibility of cofinancing universities of federal administration from regional budgets and budgets of sectoral programs; transferring local innovation infrastructure to universities);

- expanding programs of interregional and intraregional partnerships of universities, creating a single base of benchmarks and best practices of university development (internships of faculty and short-term advanced training, including remote ones, network programs, methodological support);

- forming policies for the development of the Russian regional education system and education development programs in each region, involving the Ministry, the regional government, the leading regional university, and local stakeholders (including the formation of regional scientific and educational clusters);

- establishing regional resource centers providing access to laboratory and practical equipment and methodological support online and offline.

Proposals for changing the mechanisms of state regulation of educational activities

By the current legislation, the state regulation of educational activities contains three main procedures: licensing educational activities, state accreditation of educational activities, and state control (supervision) in the field of education. The experience of the coronavirus pandemic and the transition to e-learning exposed several problems and limitations of this system and raised the question of changing some principles of regulation. In this regard, briefly consider the individual areas.

Licensing of educational activities

Licensing educational activities of higher educational institutions, regardless of their departmental affiliation and organizational and legal form, is carried out by the Federal Service for Supervision of Education and Science.

In 2015 and 2016, the Government of the Russian Federation's decisions were adopted, amending the previously existing regulation on licensing educational activities and aimed at optimizing the state licensing service and

reducing the list of documents submitted by the applicant. In particular, to obtain a license, a license applicant does not need to submit copies of constituent documents and documents on faculty. Also, instead of developing approved copies of educational programs, it is necessary to submit a certificate on their availability signed by the educational organization's head. Copies of documents confirming food conditions and information about the presence of a room for the work of medical workers are excluded.

The Federal Service for Supervision of Education and Science receives part of the documents independently within interagency cooperation. These include conclusions on compliance with mandatory fire safety re-

quirements; the sanitary and epidemiologic compliance to health regulations of the buildings, construction, rooms, equipment, and other property necessary for educational activity; and on information from the Unified State Register of Rights to Real Estate and Transactions with It. The license applicant needs only to specify the details of the listed documents.

Thus, after introducing the amendments above to the Regulation on Licensing of Educational Activities, the list of documents provided by educational organizations to the licensing body for the provision of state services for licensing educational activities is hugely reduced, and the possibility of submitting papers in electronic form is provided.

State accreditation

Recently, the procedure for state accreditation has undergone significant changes, which was greatly facilitated by the decisions of the Government of the Russian Federation adopted in 2019 and 2020, which amended and supplemented the regulation on state accreditation of educational activities (from now on, the Regulation): In some cases, a cameral examination is provided (accreditation of new academic programs, recertification of state accreditation); provided an opportunity for an educational organization to eliminate inconsistencies identified during an on-site examination within a specific time. By the current regulatory acts for state accreditation, universities submit to the Federal Service for Supervision of Education and Science, along with a statement on state accreditation, only those documents that the educational organization has itself. Such records as information from the Unified State Register of Legal Entities, information about the presence (absence) of a license, including for work using informa-

tion constituting state secrets, information about the payment by the organization of state duty for the provision of state service are received by Rosobrnadzor in the order of interagency cooperation.

An essential innovation of the Regulation, which reduces the burden on the educational organization, was the possibility of submitting documents and materials in electronic format to the state accreditation procedure with references to their placement on the official website of the university or insecure access, for example, in the electronic information educational environment (EIES). Universities actively used these resources during the pandemic. All this led to changes in the technological plan, starting from the possibility of submitting an application and a package of documents through the electronic office of the university and ending with the state accreditation procedure through the electronic office of the expert.

In the current Regulation, the emphasis placed on assessing the quality of education of students is essential. When conducting full accreditation, the expert group analyzes the materials used at the university for internal assessment of students' mastery of the competencies provided for by the educational program and selective testing of students using such materials. The Regulation establishes the legal norm of compulsory accounting for state accreditation of information on an independent assessment of students' quality of education. The register of organizations conducting the independent review is formed by the Federal Service for Supervision in the Field of Education and Science. Such organizations are subject to several requirements. In particular, when monitoring the knowledge of students, the organization should use evaluation tools that received the recommendations of the federal educational and methodological association and/or were agreed on by the professional qualifications council (if available); the organization shall refer to all-Russian or other employers' associations, associations (unions) or other organizations representing and uniting the professional community in the professional field; and experts whose qualifications correspond to the levels of education and the professions and areas of education in which the assessment is carried out should conduct an independent evaluation of the quality of education.

Currently, seven organizations are included in the register of the Federal Service for Supervision of Education and Science: the All-Russian Public Organization Medical League of Russia; National Accreditation Council of Business and Management Education (Association of Associations and Organizations of the National Accreditation Council of Business and Management Education); all-Russian public organization Russian Youth Union; Limited Liability Company Institute of Quality Control and Accredita-

tion in the Field of Culture and Art; autonomous non-profit organization Expert Center Association of Lawyers of Russia on the Assessment of Quality and Qualification in the Field of Jurisprudence; all-Russian sociostate organization Russian Society Knowledge; autonomous non-profit organization Center for Ensuring Digital Transformation.

In recent years, the Federal Service for Supervision of Education and Science has initiated several projects to develop useful evaluation tools to determine the degree of students' mastery of the necessary level of universal and general cultural competencies. Leading universities of the Russian Federation created evaluation funds.

The strategic areas for the development of the state accreditation procedure are:

▪ **developing certified evaluation materials for the evaluation of the professional component of educational programs; involving representatives of expert communities and employers in this assessment;**

▪ **maximally using objective and open data external to the educational organization to assess the quality of higher education;**

▪ **strengthening the responsibility of organizations recommending experts to participate in state accreditation, expanding the representation of leading and global universities in the register of accredited experts;**

▪ **increasing the number of expert organizations involved in independent assessment of the quality of education.**

State control (supervision) in the field of education

Each year, the Federal Service for Supervision of Education and Science conducts 120–150 scheduled and about 300 unscheduled inspections, including federal state control of the quality of education and supervision of the implementation of legislative requirements. The epidemiological situation has meant adjustments to the plans for inspections in 2020: By the decree of the Government of the Russian Federation and in agreement with the Prosecutor General's Office, reviews planned for April to December 2020 are excluded from the plan. The 2021 program does not provide for an increase in the number of field events. Several federal laws establish the grounds for inclusion in the list and unscheduled inspections.

By Decree of the Government of the Russian Federation of August 20, 2013, No. 718 "On the State Information System of State Supervision in the Field of Education and Science," the Federal Service for Supervision in the Field of Education and Science has created an information system for automating control and supervisory activities, which contains all data on inspections, detected violations and measures taken; also, information on assessments and violations detected is posted monthly and quarterly on the website of the Federal Service for Supervision of Education and Science with recommendations on State Control (Supervision) in Education to submit documents confirming the elimination of violations. This enables collecting and analyzing data on universities' activities, translating part of the verification measures into a remote format, and managing and regulating the field of education, whose functions are control and supervision, to be based on objective and reliable data sets. These processes intensified in the conditions of the coronavirus pandemic. Starting from June 2020, inspections in the area of pre-license control (reregistration, provision of

a license) and control of the implementation of instructions to eliminate identified violations are carried out using remote interaction, including audio or video communication.

The necessary regulatory legal act in the field of state and municipal control from July 1, 2021 (except specific provisions) will be Federal Law of July 31, 2020, No. 248- FZ "On State Control (Supervision) and Municipal Control in the Russian Federation." This Federal Law provides for the introduction of a differentiated approach to conducting control measures depending on the degree of risk of business entities causing damage of property. Strengthening the prevention of violations through the holding of explanatory seminars and conferences, the publication of the results of inspections, recommendations to eliminate frequent, systematic violations, and the issuance of warnings and manuals is protected by law. A draft satellite law has been prepared for education, which aims to take into account the peculiarities of monitoring educational activities, reducing the number of types of control, and reducing the administrative burden while improving the level of protection of the quality of education.

Thus, five main trends in the reloading of control and supervisory activities in the field of education can be distinguished:

1. Transparency of inspections, which is achieved through the interaction of information systems and the maintenance of relevant registries.

2. The introduction of a risk-based approach in which each organization conducting educational activities will be classified as a specific risk category, according to which the frequency of inspections will be established. When determining the risk, the Fed-

eral Service for Supervision in the Field of Education and Science will consider previous reviews, administrative penalties imposed, and measures taken based on the results of inspections.

3. Strengthening the prevention of violations through the holding of explanatory seminars and conferences, the publication of the results of inspections, recommendations to eliminate frequent, systematic violations, and the issuance of warnings and manuals.

4. Improving the organization of document management to reduce the number of requested documents, maximize the use of the interagency interaction system, and actively switch to electronic document management.

5. Introduction of a new type of inspections without interaction with organizations carrying out educational activities, such as monitoring the posting of information on the Internet, compliance with the Russian Federation's legislation on the protection of children from information harmful to their health and development.

New trends in the control and supervisory activities of the Federal Service for Supervision of Education and Science have shifted the emphasis from a purely bureaucratic approach to the implementation of preventive work, building dialogue with educational organizations to improve education quality.

At the same time, significant joint work will be required to form a business relationship between persons under control and the monitoring body and reduce the administrative burden. **Simultaneously, the development of an institute of pedagogical responsibility and an increase in the level of legal literacy should become decisive factors on the part of educational organizations.**

Changes in control and supervision activities in the educational sphere

The goal of changes in control and supervisory activities in the educational sphere should be introducing a risk-oriented approach. At the same time, the main directions of modernization of state control and supervision in the field of higher education should include: changing the system of mandatory requirements, combining the licensing and accreditation procedures of universities over time, moving to new principles for organizing verification events, and changing the approach to assessing the quality of educational services. Among the fundamental principles in implementing these changes, it is necessary to note the proportionality of the administrative burden to the amount of expected damage from noncompliance with mandatory requirements, the dependence of the frequency of inspections on the likelihood of a violation of mandatory requirements, and the amount of damage to values protected by law, ensuring verifiability of compliance with mandatory requirements, and the formation of clear recommendations on priorities for eliminating violations in the conditions of budgetary restrictions of educational organizations[38].

[38] OECD Regulatory Enforcement and Inspections Toolkit / OECD. Paris, 2018. URL: https://doi.org/10.1787/9789264303959-en

Change of mandatory requirements system

The revision of mandatory requirements should consider the principle of proportionality of the resulting administrative burden and the expected value of damage to the values protected by law as a result of failure to fulfill the corresponding mandatory requirements. To reduce the administrative burden, it is advisable to exclude mandatory requirements, the execution of which does not lead to a reduction in the probability or amount of damage when implementing adverse events (taking into account the costs of their performance and administration). Monitoring and supervision of compliance with the remaining mandatory requirements should be carried out in proportion to the severity of the consequences of the implementation of relevant adverse events[39]. The performance of a risk-based approach in verifying mandatory requirements also implies that a presumption must be formulated for each condition, the verification of which is carried out during the implementation of the state function of monitoring and supervision in higher education. The determination of the presumption in the proof of a mandatory requirement should be based on the consequences of its violation: For compulsory requirements, the likelihood of damage from nonfulfillment of which is high, it must be proved that the mandatory requirements are fulfilled (with the presumption of their violation); for mandatory claims, the probability and damage of nonfulfillment from which is low[40], it is sufficient to accept the idea of nonviolation of compulsory licenses. For example, in the case of inspection of a chemical laboratory (exhaust and other installations) or other classrooms where equipment dangerous to the life and health of trainees is located, it is necessary to use the presumption of their malfunction; in the case of verification of a computer class, it would be the serviceability of computers.

An analysis by the Russian Academy of National Economy and Public Service and the All-Russian Academy of Foreign Trade of the list and content of mandatory requirements shows the need for changes and clarifications of compulsory specific requirements. The proposed changes are mainly aimed at eliminating existing gaps in control and supervision in higher education related to the uncertainty of particular needs, which leads to an increase in the number of recorded violations. Conditions outside the competence of the Federal Service for Supervision in the Field of Education and Science should be excluded from the mandatory requirements of licensing and license control (in particular, it is prohibited to check the compulsory requirements when issuing sanitary and epidemiological conclusions and conclusions of the Ministry of Civil Defense of the Russian Federation), the possibility of determining and including requirements for the area of educational organizations for a given contingent of students is considered. Requirements for the qualification of faculty should be significantly clarified (including provisions for the level and area of education). In particular, a transparent mechanism has been developed to determine the conformity of a teacher with the discipline he or she reads at the federal level, which would take into account the specialty or direction of the primary education of the teacher, the availability of the degree and title, the field of sciences in which a degree was awarded, and the presence of professional experience and higher professional qualification among the teacher in the discipline.

[39] OECD Risk and Regulatory Policy. Improving the Governance of Risk / OECD. Paris, 2010. URL: https://dx.doi.org/10.1787/9789264082939-en

[40] Reputational losses of universities as a result of verification activities should be considered separately

Mandatory requirements that determine the quality of educational activities should be clarified. In particular, the needs of the Federal State Educational Standards in specialties and areas of education should be changed: The main requirements should be the requirements for the content of disciplines included in the subject core of the field or specialty and the duration of blocks of educational programs. Provisions related to the competencies of graduates of areas and specialties should not be mandatory.

Among the mandatory requirements of state supervision in the field of higher education, the requirements for issuing educational documents should be specified, an exhaustive list of requirements for local normative acts of the educational organization of higher education, in particular, and a complete list of local regulatory acts should be formulated, which is currently exemplary, and the requirements for its placement on the website of an educational organization of higher education specifying the criteria for the provision of services of third-party organizations in the region of an educational institution of higher education, requirements for a single form of information provision and assurance of its reliability, as well as the need to (not a way to) provide special conditions for persons with disabilities.

Consolidation of licensing and accreditation procedures

Licensing and accreditation procedures should involve the simultaneous one-time receipt by the organization of a license for the right to carry out educational activities and a certificate of accreditation of the university as a whole (if the university claims it).

Simultaneously, both the requirements for the conditions of education (license requirements) and the requirements for the quality of educational programs implemented by the university (accreditation requirements) should be checked. According to the audit results, it is possible that the university simultaneously implements both accredited and nonaccredited programs (for example, if the program did not pass primary accreditation or did not pass a federal-state quality control and was excluded from the accreditation certificate). For new educational organizations that want to start implementing vocational education programs in higher education, and for new vocational training programs, these changes will imply a single passing of verification measures related to checking the adequacy of educational conditions.

Subsequent regular inspections within the licensing control framework, federal-state quality control, and state supervision in education should be replaced by monitoring the system by risk indicators[41]. Review of the university (visiting, documentary, and remote), depending on its goals, can be carried out at the university's request or by the

[41] For example, by analogy with the experience of implementing a system of risk indicators in the educational sphere in Australia: Tertiary Education Quality and Standards Agency. Risk Assessment Framework, Version 2.3 // Tertiary Education Quality and Standards Agency : official website. 2019. URL: https://www.teqsa.gov.au/latest-news/publications/ risk-assessment-framework; Tertiary Education Quality and Standards Agency. How TEQSA Rates Risk Indicators // Tertiary Education Quality and Standards Agency : official website. 2013. URL: https://www.teqsa.gov.au/latest-news/publications/ how-teqsa-rates-risk-indicators

Federal Service for Supervision's administrative activities in the Field of Education and Science. In the first case, the motivation for conducting verification measures is the need to make adjustments to the license or certificate of accreditation of the university due to significant changes in the activities of the university (for example, licensing new areas of training or specialties, licensing a new address at which educational activities will be carried out, etc.). In the second case, the basis for forming the relevant administrative act is the number of risk indicators in a critical area indicating a high probability of violations or verification of the university's elimination of violations identified in the framework of previous control and supervisory measures.

In our proposed approach to regulation, there are four options for going through a procedure that grants the right to carry out educational activities and guarantees the provision of high-quality educational services by the university (taking into account the possibility of accreditation in part of the programs). The first option corresponds to meeting the licensing requirements and the requirements of certification of the university for all educational programs planned for implementation at the university. This means that the university has the right to carry out educational activities, the quality of which is guaranteed by the state. In the second version, the university meets all licensing requirements and accreditation requirements for the part of the educational programs planned for implementation. This result of passing the verification procedures means that the state's quality of educational activities is guaranteed only for individual academic programs. The third option is that the university meets only license requirements. The government does not ensure the quality of educational activities, in this case. The fourth option meets one or more licensing requirements. At the same time, the university is denied the right to conduct educational activities if it is possible to repeat accreditation.

Transition to new principles for verification activities

A risk-oriented approach to determining the objects chosen for verification should include constructing a risk management system that allows for an automated assessment of the likelihood of violations of mandatory requirements by the university and decisions on the need for unscheduled verification[42]. At the same time, planned and unscheduled inspections on applications of individuals, legal entities, media, and state authorities can be abolished without increasing the risks to the higher education system.

A change in the approach to control and supervisory activities in higher education should be preceded by constructing a new state information system that integrates large data sets on universities from various sources, including interdepartmental registers of information on issued documents, university databases, and others[43]. The method of risk indicators should be based on an analysis of large data sets on universities' activities and information on violations

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[42] Baldwin R., Black, J. Really responsive regulation // The modern law review. 2008. Vol. 71 (1). P. 59–94; Black J., Baldwin, R. When riskbased regulation aims low: Approaches and challenges // Regulation & Governance. 2012. Vol. 6 (1). P. 2–22.

[43] Hampton P. Reducing administrative burdens: effective inspection and enforcement. HM Stationery Office, 2005. Example of building a database in Australia: Tertiary Education Quality and Standards Agency. How we use data // Tertiary Education Quality and Standards Agency. URL: https://www.teqsa.gov. au/how-we-use-data/

of mandatory requirements to assess a particular university's likelihood of violating certain required provisions. Since some mandatory requirements contain specific quantitative (for example, requirements for the number of credit units) or qualitative (for example, requirements for the presence of a medical worker and a medical office) indicators of the activities of educational organizations of higher education, **the analysis of the activities of universities can be carried out in several ways**[44].

The first method involves determining critical areas and monitoring the dynamics of individual quantitative and qualitative indicators related to the fulfillment of mandatory requirements (enshrined in them directly or indirectly associated with their implementation), provided that these indicators may have a temporary or percentage deviation from the maximum or minimum values fixed in the current legislation. For example, a small area of classrooms with a large number of students studying fulltime may indicate the risk of poor-quality educational services, but this does not exclude the possibility of another explanation of this situation, such as students' education in several shifts if there is appropriate permission. The principle for this approach is to monitor the fulfillment of mandatory requirements either directly or using a quantitative or qualitative indicator that indirectly indicates the likelihood of satisfaction (nonfulfillment) of the corresponding requirement.

The second method involves an analysis of the observed characteristics of the activities of universities that are not directly related to the fulfillment of mandatory requirements, for example, indicators of the publication activity of scientific and pedagogical workers of universities, salaries of faculty, the average exam score of students upon admission, and others. This method involves quickly verifiable indicators, which significantly speeds up and simplifies the verification process without requiring the study of educational organization documents and additional verification activities.

The third method combines the two previous approaches. It involves defining a critical area and monitoring the dynamics of a specific integral indicator (an indicator characterizing the probability of risks by types of control and supervision in higher education, which is a linear combination of risk indicators[45]), determined based on the above mentioned indicators.

Access for a particular university with risk indicators to a critical area corresponding to a high probability of violation of mandatory requirements by this university should not be the basis for the supervisory authority's conclusion about the presence of breaches in it. Still, it should lead to the corresponding educational organization needing on site inspection, desk audit or remote verification.

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[44] For example, based on the principles of selectivity, risk-orientation, taking into account all available information in the implementation of regulation. See: OECD Regulatory Enforcement and Inspections Toolkit / OECD. Paris, 2018. URL: https:// doi.org/10.1787/9789264303959-en

[45] The coefficients of the linear combination can be determined by estimates of the coefficients of the probability model of violations of mandatory requirements (logit / probit). For example, the Australian independent national Agency for Quality Assurance and Regulation of Higher Education TEQSA conducts an integrated risk assessment for an educational organization by weighing the values of risk indicators of an educational organization (indicators of academic performance of its students, student outflow from the educational organization, financial stability, the ratio of the number of students and staff, including teachers of the educational organization, etc.), the weights used are not disclosed. For more information, see: Kristoffersen D. Quality Assurance and Public Accountability / Council for Higher Education Accreditation. 2019. URL: https://www.chea.org/sites/ default/files/pdf/PAR-Feb15-FINAL.pdf

A new approach to assessing the quality of education

The change in the approach to assessing the quality of education and the introduction of direct measurements should, first, **mean the presence in the Federal State Educational Standard of a subject core that defines the minimum set of fundamental disciplines** necessary for graduates of the relevant fields and specialties, and the content requirements for them that allow assessing the content and knowledge of graduates of appropriate educational programs, including using digital technologies. Second, **it is advisable to introduce the option of direct assessments of students' learning,** which involves the need to develop sets of control and measurement materials to ensure the possibility of conducting verification work for students when carrying out state quality control of educational activities initiated as a result of risk indicators entering a critical area. Third, **it is necessary to ensure the possibility of conducting an expert assessment of the quality of education in accreditation of an educational institution of higher education, based on the principles of a comparable level of qualification of the subject and subject of assessment,** where the capability of the issuer of the evaluation should not be lower than the staff of the faculty implementing the evaluated programs and has a significant reputation among the subject of assessment in the subject area, in which he or she is an expert and lacks anonymity in the evaluation (ensuring the public availability of signed expert opinions). Implementing this approach is possible when forming an adequate system of incentives (including economic ones) both when selecting experts by the supervisory authority and when evaluating their activities. However, this approach carries the following risks: When regulating the content of the subject core, damage may arise to the variability of the content of education and the development of new specialties, and when introducing verification work for students, difficulties may occur with the formation of a bank of control and measuring materials.

An alternative to the approach we have proposed is to develop confidence-building mechanisms to monitor the quality of education. In world practice, a common way to assess educational programs' quality is through professional and public accreditation and the use of international ratings and monitoring research as a basis for simplified accreditation by universities. However, the use of such accreditation mechanisms is, in our opinion, debatable: on one hand, the refusal to formally check documents in favor of trust mechanisms will lead to the formation of a culture of quality and reputation in the academic community, but on the other, such a culture of trust in trust mechanisms in our country has not yet been formed, which makes their implementation difficult. The risks of using this approach are subjectivity of the results in vocational and public accreditation and the inadequacy of current ratings and monitoring, which are more focused on reducing the asymmetry of information between various participants in educational activities (universities and applicants, graduates and employers[46]) than on the tasks of control and supervisory activities.

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[46] Hazelkorn E. World-class Universities or World-class Systems: Rankings and Higher Education Policy Choices // Rankings and Accountability in Higher Education: Uses and Misuses. UNESCO, 2013. Ch.: World-class Universities or World-class Systems: Rankings and Higher Education Policy Choices / P.T.M. Marope, P.J. Wells, E. Hazelkorn (eds.). P. 71–94.

Changing approaches to educational activities under the influence of digital technologies should mean the automation of part of the control and supervisory procedures in assessing the quality of academic programs by using machine analysis of texts of working programs of disciplines and educational programs; analysis of data on scientific activities and qualifications of scientific, pedagogical personnel (machine analysis of publication activity and citation); and analysis of digital materials created during the transition of universities to electronic digital educational technologies (analysis of video and sound recordings of lectures and seminars implemented remotely).

The changes under consideration will help optimize the load on the supervisory authority represented by the Federal Service for Supervision of Education and Science and on controlled facilities, the universities. Depending on how the proposed changes are implemented, differences in the efficiency and effectiveness of control and supervision activities in higher education can be expected. Firstly, **the proposed solutions will change the number of mandatory requirements for ensuring the quality of educational activities,** mainly those related to the revision of the Federal State Educational Standard's content and the clarification of specific requirements in the field of licensing control and state control of the quality of education. Secondly, **a reduction in the number of checks can be expected due to the abandonment of scheduled inspections and the transition to monitoring observed risk indicators.**

The experience of the transition to risk-oriented regulation of other control and supervisory bodies indicates a possible reduction in the number of inspections by 20–30 percent.

Third, **increasing the transparency of the content of mandatory requirements and the objectivity of verification procedures,** including the refusal to use expert assessments of compliance with compulsory specific requirements, will contribute to reducing the number of regulations related to meeting the legal needs of the Federal State Educational Standard that are not directly related to the quality of educational activities (for example, the requirements for mastering the necessary list of competencies by graduates of educational programs).

Proposed measures

FEDERAL REGULATORY LEVEL

Operational measures:

1. Change in the list of mandatory requirements, compliance with which is checked by the Federal Service for Supervision in the Field of Education and Science:

- excluding mandatory requirements, the execution of which does not lead to a reduction in the probability or amount of damage during the implementation of adverse events;

- excluding claims outside the competence of the Federal Service for Supervision of Education and Science;

- clarifying mandatory requirements aimed at reducing risks during educational activities (mainly inaccessible, poor-quality, unsafe education), the inaccuracy of the wording of which leads to an additional burden on universities (increases the likelihood of recognizing the university as an offender due to possible differences in the interpretation of mandatory requirements by the object and subject of control).

2. Consolidation of the principle of monitoring and supervision of compliance with mandatory requirements in proportion to the severity of the consequences from the implementation of related adverse events:

- determining the presumption when verifying a mandatory requirement, depending on the severity of the consequences of its violation;

- establishing measures of influence on universities that have violated mandatory requirements, depending on the severity of the consequences of their violation.

3. Change in the procedure for admission of universities to educational activities:

- unifying licensing and accreditation procedures on remote studying of documents and on-site verification (simultaneous one-time receipt by the organization of a license for the right to carry out educational activities and a certificate of accreditation of the university as a whole or individual educational program);

- replacing follow-up checks with monitoring the risk indicator system in a risk-oriented approach.

4. Implementation of a risk-based approach to university audits with the possibility of automation:

- building a new state information system that integrates large data sets on universities from various sources, including interdepartmental registers of information on issued documents, databases from universities, and other sources, to automate some control supervision procedures;

Strategic measures:

1. Support for quality culture at the university.

2. Change of approach to state accreditation of educational activities:

- implementing the option of direct assessments of learners' knowledge and competencies;

- providing the possibility of conducting an expert assessment of the quality of education in the process of accreditation of an educational institution of higher education (with ensuring its significance due to high qualifications and reputational costs of experts).

- building a risk management system that provides automated assessment of the probability of university violations of mandatory requirements and makes decisions on the need for unscheduled verification;

- initiating verification measures (documentary, visiting, remote) in case of risk indicators entering the critical area.

3. The introduction of an alternative option to change the accreditation procedure—the development of trust mechanisms for monitoring the quality of education by ensuring the possibility of conducting level accreditation, taking into account the results of certification of internal systems for assessing the quality of education, using data from international, subject/industry, and institutional ratings.

Measures to ensure the economic sustainability of higher education in the new environment

The consequences for higher education from the coronavirus pandemic will be not only educational but also economic. The development of remote and online education technologies, a combination of face-to-face and remote formats, will require changes in higher education's managerial and financial models both when the pandemic continues and after it has ended.

According to the federal budget adopted for 2020 and the planning period 2021-2022, with an increase in the budget contingent, budget expenditures per budget student, after inflation, would have decreased even without a pandemic. Given the pandemic, they could fall even further. Also, the number of paid students and the number of tuition fees may decrease, which will worsen many states' economic situation and private universities. Students often perceive distance learning as a transition to a less high-quality educational process, which requires return of part of the tuition fees and reducing tuition fees from paid students of the second and subsequent courses (similar processes are observed in most foreign universities).

The challenge of preserving the financial and operational sustainability of universities

In connection with the current economic situation and the introduction of measures to prevent the spread of new coronavirus infection in the Russian Federation, a significant deterioration in the financial and economic condition of educational organizations is predicted. It is expected to reduce the extrabudgetary revenues of universities in 2020 by 20 to 60 percent. This is due to:

▨ the fall in paid admission rates in 2020 due to a sharp decrease in demand for paid education due to growing uncertainty and a decrease in incomes of the population;

▨ the reduction of the admission of international students in 2020 due to migration restrictions;

▨ the increase in tuition arrears of students studying in paid places, due to the sharp contraction of the labor market and the loss by most students of the opportunity to work part-time during the course of study;

▨ reduction (or temporary termination) of funding for research and expertise by corporate customers and regional administrations, which in the next two to three years will entail stagnation or reduction of university revenues from contractual research and innovation.

Reduction of off-budget receipts will result in the need to reduce the employees' salary and, as a result, the growth of social tension in personnel. There is a real risk of nonexecution of the key indicators established by the Decree of the President of the Russian Federation of May 7, 2012, No. 597. In this regard, it is necessary to preserve the volume of a subsidy of 2020 for the financial security of the state task of higher education institutions regardless of the extent of its possible nonexecution in cases when the specified nonexecution is caused by such reasons as nonexecution of quotas on the reception of international students, the suspension of research caused by lack of access to scientific equipment in a long quarantine, etc.

Need for additional federal initiatives

To stabilize the financial situation of the universities would grant support to targeted programs aimed at the technological upgrade and development of personnel potential of universities, the implementation of project forms of education, participation of universities in regional development projects, performing research and creating scientific foundations, and integration with industrial partners and institutes of RAS. The resource requirement for this measure is about 25 billion rubles.

Currently, most universities cannot use the **0 percent rate on income tax because their income is not taken as educational and scientific activities in the corresponding list established by the Russian Government and exceeds 10 percent.** In particular, this list does not include pilot-implementation, expert-analytical, and innovative activities, objectively part of universities' specialized scientific and educational activities.

The reduction of extrabudgetary income of educational organizations, in addition to the general deterioration of their financial condition, entails a change in the structure of such payment, making it, in principle, impossible for them to apply for the current income tax benefit. An adequate measure is to clarify the composition of activities included in the list of specialized activities in calculating the threshold for using for the service by having activities related primarily to the commercialization of the results of intellectual activities. It is necessary to lower the established threshold from 90 to 75 percent. The use of this measure will free up funds from universities of at least 5 billion rubles.

For individual universities that are at risk of temporary cash gaps, but while maintaining their general financial stability, bringing the subsidy to the state task's financial support ahead of schedule is relevant.

One of the operational tools for stabilizing the financial stability of universities at risk may be providing them with one-time financial assistance at the expense of the federal budget in the amount corresponding to the forced costs incurred by universities in connection with epidemiological measures (processing of premises, covering the costs of maintaining infrastructure during downtime, reimbursement of the expenses for ensuring remote work of faculty, etc.), which will allow them to restore solvency and avoid cash gaps.

Reorganization measures and similar measures may be considered necessary by the university's founder, which allowed the loss of financial stability in cases of disagreement of the founder with the university management's crisis plan.

Development of distance learning and online education technologies

The development of distance learning and online education technologies is impossible without developing the information and computer infrastructure of universities.

In general, the need for budget funds for the development of the digital educational environment (DEE) of universities will be:
▪ accelerating development of the DEE for Higher Education in the 2020–2021 academic year: 19.0 billion rubles;
▪ providing students and teachers with stationary computers, laptops (tablets): 15.0 billion rubles (taking into account the increase in students' budget).

The total costs of developing the digital educational environment of universities can be estimated at 34 billion rubles

Accordingly, this amount should partially increase the costs of the Federal project Digital Educational Environment of the national project Education and partially, the costs of the national program Digital Economy of the Russian Federation.

Support access to higher education, employment, and social benefits for students

To maintain the level of social guarantees, and the stability of organizations' financial conditions, a gradual increase in the budget admission to undergraduate, specialist, and master's degrees programs is necessary. **Increasing budget admissions can be an effective form of support for access to higher education for young people.** This measure has already been applied in 2020 when the admission control figures increased by more than 33 thousand. It is also relevant to increase the availability of educational lending with a subsidized rate: It is necessary to ensure a reduction in the effective interest rate paid by students to 3 percent per annum (or one-half of the Central Bank's discount rate) from the current 8.9 percent per annum and at the same time increase the loan repayment period from 10 to 15 years after graduation. This measure has already been implemented by the Russian Federation's government[47], which has created the conditions for solving the problem of paying 15 percent of the contingent of students studying at paid places (100 thousand people annually). Assessment of the need for funds in the federal budget is 11 billion rubles in 2020–2022.

One of the effective measures to support student employment and at the same time stimulate solvent demand should be a **program to promote student employment in universities where they study, with funding from the federal budget until the end of 2020 and in 2021.** Payments per student should be at least one subsistence minimum in the corresponding region (at least two for work requiring high qualifications). If this measure covers up to 120 thousand students, the need for federal budget funds in 2020–2021 will be about 20 billion rubles.

In the context of the decline of the Russian economy shortly, a significant reduction in jobs and vacancies in the labor market is expected (up to 15 percent of the number of employees). This will entail high competition, which most graduates in 2020 and 2021, objectively will not be able to withstand and find employment after graduation. **One of the useful tools for involving university graduates in the labor market is paid internships at enterprises. This measure is granted to companies hiring graduate students for six-month internships in professions corresponding to their training areas (compensation for up to 90 percent of paying graduates' costs, but at least two subsistence minimums for each).** With the scale of such a program up to 25 percent of graduates of the 2020–2021 school year (about 140 thousand people), the need for federal budget resources will amount to 28 billion rubles in 2021.

A decrease in household incomes will lead to a significant increase in the number of students eligible for a state social scholarship, which will entail a shortage of scholarship funds allocated to universities from the federal budget. According to current estimates, to maintain the possibility of issuing a state social scholarship in the prescribed amount, considering the number of recipients, the total amount of scholarship grants issued should be increased by 9.5 billion rubles per year starting in 2020.

Measures to support youth through increased access to higher education to prevent their mass unemployment can be estimated at a maximum of 165 billion rubles for the 2020–2021 school year. As the economy recovers with the end of the coronavirus pandemic, these costs will decrease.

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[47] Постановление Правительства Российской Федерации от 19 августа 2020 г. № 1256.

The costs of implementing these measures can be partially reduced by attracting to work as assistant teachers and tutors of undergraduates and postgraduate students, students of the fourth and fifth years of specialty (at the same time, socially attractive jobs are created for them in the context of the economic crisis).

Budget expenditure to prevent mass youth unemployment:

▦ budget expenditures on increasing budget places in universities when accepting a bachelor's degree and specialty to 60–65 percent of the number of graduates of 11th-grade schools: 5.0–12.0 billion rubles;

▦ budget expenses for admission to universities of graduates of law enforcement organizations who have completed middle-level training programs up to 15 percent of graduation: 22.0 billion rubles;

▦ budget expenses for increasing admission to the master's degree of undergraduate graduates (from 30 to 45 percent): 19.0 billion rubles;

▦ creating additional jobs in universities for students: a maximum need of 50.0 billion rubles a year.

Financing activities to support individual universities or activities

Additional funding will require:

▦ development programs for all universities, especially for universities in a difficult financial situation and with a soft material and technical base, if their training is necessary for their social and economic development. The need for budget funds for the implementation of this measure can be estimated at 1–1.5 billion rubles;

▦ expansion of basic and applied research in all universities, promotion of scientific and technical progress according to thematic plans, purchase of educational laboratory and scientific equipment (on average from 50 to 150 million rubles per one university, or for 200 universities at least 10 billion rubles);

▦ continuation of work on restructuring the budget network of universities;

▦ development by leading universities of online courses for use in the educational process by all universities (the cost of developing a full-fledged online system is estimated at 1.2 million rubles when preparing 5 thousand lessons, expenses will be 6 billion rubles);

▦ centralized procurement at the state level of electronic databases of books and magazines and provision of free access for all universities (public and private) to these resources (at least 3 billion rubles a year);

▦ upgrading the qualifications of teachers, especially the mastery by university teachers of the skills of working with remote educational technologies (an additional 700 million rubles will be required);

▦ training and advanced training in leading universities of management teams of other universities (an additional 300 million rubles will be required);

▦ attracting the remaining universities to participate in R&D of leading universities (10 million rubles on average per 1 university, or 200 universities at least 2 billion rubles);

▦ creating by leading universities a modern system of continuing education, including the development of boarding schools for exceptionally gifted children and lycées for high school students, including distance students, the selection of talented school graduates through subject olympiads, as

224 billion rubles

will require a full package of crisis measures in the 2020—2021 school year

well as the selection of bachelor's degree graduates based on the results of special olympiads for admission to master's studies, including with the participation of foreign citizens, graduates of bachelor's programs of foreign universities (1-1.5 billion rubles a year when creating 3-5 boarding schools and annual olympiads).

Thus, the additional budget costs for financing the activities mentioned above will amount to 24–25 billion rubles.

The current model of regulatory per capita financing

Since 2013, Russia has introduced normative per capita financing of universities, which aimed to create a quasi-market for higher education and quasi-price incentives for universities to increase the effectiveness of their activities.

As part of this model, the university receives:
▦ according to the competition, a state task and a subsidy for its implementation, which is calculated based on the value of standard costs per student; this subsidy includes almost all charges for the maintenance of property (payment of housing and communal services, costs for ongoing repairs, etc.);
▦ a subsidy for other purposes, including the purchase of equipment, software, and overhaul;
▦ new construction financed by funds of the federal targeted investment program.

At the same time, it is not taken into account that education is a socially significant good. This is highly differentiated since each university has its niche and market power.

Higher education is becoming more individualized, and universities vary greatly in the complexity of their programs. Also, not all university expenses depend on the number of students. Therefore, the inclusion in the per capita financing standards of costs that do not rely on the budget contingent's size leads to severe distortions in funding.

An attempt to economically force weak universities to leave the market only leads to a decline in the quality of education and state property's inefficient use. If the economy and the social sphere need the personnel that a weak university prepares, it should be supported (with a possible change in management and teaching teams), and if they are not required, be closed.

Main directions of the reform of the budget financing model of higher education institutions

Over the past 10-15 years, it has become increasingly common to consider the need to increase budgetary funding for higher education institutions as part of a budget maneuver in favor of productive budget expenditures. In the context of the pandemic, such a task becomes especially urgent. At the same time, it is necessary to reform the model of financing universities. First, the needs for budget financing of various universities have become even more differentiated. Second, with the development of distance learning technologies, which will be applied much more widely after the end of the pandemic, the costs of universities will increasingly depend on the number of students.

The central partitioning in reforming the budget financing model of universities consists of the ratio of the share of subsidies for implementing the state task and grants for other purposes in the total amount of budget funding for educational activities.

Option 1

The subsidy for implementing the state task is reduced. Only expenses directly related to the provision of educational services, primarily with the number of students, remain in the per capita standard. The subsidy for other purposes is increased. All costs not directly related to the number of students are transferred to it, including the cost of developing the DEE, maintaining it, creating online courses, and increasing the number of assistant teachers and tutors working with students in a distance format.

Option 2

The subsidy for implementing the state task for education increases since more and more of the universities' expenses are introduced into the per capita standard, including those related to DEE development. The subsidy for other purposes is relatively reduced.

MAIN MEASURES

Option 1

▪ The state task for education for each university is established by the Ministry of Education and Science of Russia with the participation of the founder of the university (without competition) for three years in a rolling manner (a competition for the distribution of a certain number of budget places is held only among private universities);

▪ Basic budget funding standards include only variable costs (a small number of components: wages, social payments, costs of educational literature and other educational materials, including electronic ones);

■ All other expenses of the university, taking into account new needs, are financed based on costing by standards for cost elements (housing and communal services, maintenance, development of digital educational environment, purchase of consumables, academic exchanges, including virtual, transportation, and communication costs);

■ University development programs are financed based on article-by-article costing; their founders agree on indicators of university development programs;

■ The change of the plan of financial and economic activity is carried out by the university independently: It is allowed to redistribute expenses between items depending on specific conditions of economic activity;

■ Tuition fees for students who study on a paid basis are independently established; the restriction "not lower than the budget standard" is abolished.

Change in the methodology for calculating per capita financing standards, a new model of budget financing for universities

In the new model of budget financing of universities, it is advisable to leave as part of the basic standard:

■ labor costs and payments for compensation of the faculty and other employees of the educational organization who are directly connected with rendering public service;

■ costs of educational literature, periodicals, publishing and printing services, electronic publications, and related public services.

At the same time, the basic value of the standard of costs for salaries of teachers (with accruals) should be established as one for all undergraduate and specialty educational programs, and as one for all master's programs—110 percent of the base value of the standard of costs for teachers (with accruals) of a baccalaureate/specialty, uniform in all programs of the third level of higher educa-

tion, and 130 percent of the basic value of the standard of costs for teachers' salaries (with accruals) in the educational programs of the master's degree. The basic value of the standard of costs for teachers' remuneration (with accruals) for residency programs should be 125 percent of the basic value of the standard of costs for teachers' remuneration (with accruals) for educational programs of postgraduate/adjunct/assistant internships.

It is advisable to transfer all other elements of the base standard's cost structure to a subsidy for other purposes, which is calculated taking into account the current tariffs (prices) for work and services in the subject of the Russian Federation.

Labor costs for employees (with accruals) who do not directly participate in the provision of state services for the implementation of educational programs are also calculated based on costing, since the salaries of administrative and economic personnel are related to the maintenance of buildings and structures and the organization of current and major repairs.

The cost of salaries of training and support personnel (with accruals) is linked according to the established standards to the faculty's remuneration because the training and support personnel organizationally provides the educational process.

It is advisable to keep all existing industry correction factors, while the value of universities' efficiency factors can be changed.

It is also advisable to increase the ratios for part-time and distant forms of education, taking into account their gradual transfer to a remote format using online forms of organizing the educational process. It is advisable to increase the correction coefficient for the full-time form of education from 0.25 to 0.5 in 2021–2022 and the correction coefficient for the

correspondence form from 0.1 to 0.15 with an increase in the share of distance learning of correspondence students to 20 percent in 2021 and to 0.25 with an increase in the share of distance learning to 30 percent in 2022–2023.

Of the currently established two regional coefficients for accounting for the requirements for the average salary of university professors, it is advisable to maintain only a correction coefficient, taking into account the average wage level in the region, for state services for the implementation of educational programs in the field of higher education (established in all subjects of the Russian Federation), regardless of the departmental affiliation of the university.

The total amount of the subsidy for the state task's performance is determined based on the per capita standards calculated in this way and the average annual reduced number of students.

The maintenance of the entire material and technical base of the state university, including ongoing and capital repairs and the purchase of equipment, is carried out based on costing and is included in the subsidy for other purposes because it is state property. All property and land taxes are also taken into account in subsidies for other purposes, without considering the factor of the paid activity, which is abolished.

A separate part of the subsidy for other purposes, as before, is the financing of scholarship support.

University development programs are financed taking into account the effectiveness of the university's implementation of previous development programs or certain elements of these programs. The corresponding financing is brought to the university in the form of a subsidy for capital investments (in the investment part of the development program) or as part of a subsidy for other purposes.

Option 2

Save the current system with the following changes:

▪ Extension of sectoral quality ratios to all universities (currently they apply only to universities that have the right to their own educational standards by Art. 11 of the Federal Law "On Education in the Russian Federation"). The opportunity to switch to an increased funding standard depending on achievements in education and science and performance will create transparent and powerful incentives for any university to meaningfully adjust its strategy and increase personnel capacity and technological renewal.

▪ The transition to the establishment of standards for the entire period of study from the current model of annual calculation for the entire contingent of students is by analogy with the norm of the law on education for the establishment by universities of the full cost of paid education for the entire period of study. In particular, this measure will smooth the transition to an increased level of regulatory funding with the extension of quality factors throughout the system.

▪ Adaptation of the structure of standards for financing educational services to modern educational technologies is by accounting for the costs of information and technological support of the educational process, the development and updating of digital educational resources (including through depreciation) and an increase in the share of the remuneration fund for training and support personnel (including organizational and methodological support of online processes).

General measures for options 1 and 2

Introduction of mechanisms for targeted financing of state educational services are through social certificates, starting with an experiment on the distribution of budget places for winners and prize-winners of the all-Russian olympiads of schoolchildren.

Program and earmarked funding

In addition to improving the standards that ensure the basic functioning of the higher education system, programming and targeted financing mechanisms should be developed that allow targeted responses to independent industry development problems, such as:

■ further restructuring of the property security of universities through the formation of standards for such security and optimization of the composition of property not used in the main activities of universities;

■ retaining in Russia of scientists with internationally recognized results through a program of compensating the costs of universities that provide them with competitive conditions for scientific work;

■ providing a system of accommodation for nonresident and international students through a program for the construction of campuses and the organization of mechanisms for placing students in the rental housing market with differentiated conditions and with the participation of universities;

■ supporting network forms of educational programs and academic mobility of students, including through the removal of regulatory and economic barriers to interuniversity and intersectoral cooperation in higher education;

■ building a motivational model of scholarship provision that creates personal incentives for students. The scholarship should allow students and graduate students to devote their free time to develop and not to finding ways to feed themselves and their young family. The establishment of a scholarship at the average salary of novice specialists in the relevant specialty will expand students' opportunities in the educational process.

Proposed measures

A flexible combination in the future financial model of two basic mechanisms—regulatory per capita financing of educational services and program-targeted financing for development and reforms—should ensure faster growth in the higher education system's quality with acceptable budget restrictions. Briefly, the following measures are needed to ensure higher education's economic sustainability in the new environment.

FEDERAL REGULATORY LEVEL

Operational measures:

1. Measures to prevent mass youth unemployment:
■ increasing the number of budget places in 2021, depending on the economic situation, up to 60-65 percent of the number of graduates of 11th grades (in 2020, 57 percent);
■ increasing the admission to universities on a budget basis of graduates of organizations of

secondary vocational education who have completed training programs for middle-level specialists, up to 15 percent of graduation from professional educational organizations;
- increasing admission to the master's degree of undergraduate graduates from 30 to 40–45 percent;
- promotion of employment of university graduates in 2020–2021, including through the program of grants to companies hiring graduate students for six-month internships in professions corresponding to their training areas (compensation for up to 90 percent of such expenses).

2. Measures to ensure the financial sustainability of universities in the face of the economic impact of the pandemic:
- maintaining the volume of the 2020 subsidy for the financial support of the state task of universities, regardless of the degree of its possible nonfulfillment;
- an increase in the basic financial standards for the state assignment for educational services of higher education from 2021 (compensation for inflation and adaptation of the cost structure to new conditions).

Strategic measures:

1. Modernization of the system of normative per capita financing of educational services of higher education, taking into account possible alternative scenarios:
- reduction of the share of financing brought through the standard due to the allocation from the per capita standard of types of costs that are not directly related to the provision of the service, and the transition to their financing for subsidies for other purposes, the preservation of the per-capita standard for wages with the application of increasing sectoral and regional ratios to it;
- further development of the current standard calculation model by updating the cost structure and expanding the application area of increasing industry factors; transition to setting standards for the entire educational period.

2. Introduction of mechanisms for targeted financing of educational services through social certificates (starting with winners and prize-winners of all-Russian olympiads of schoolchildren and participants in international olympiads who receive the right to enter the university without entrance tests).

3. Further restructuring of universities' property security by creating standards for such protection and optimizing the composition of property not used in the main activities of universities.

4. A sharp expansion of the accommodation system of foreign and nonresident students (by the modernization of university dormitories and the use of the rental housing market).

5. Ensure that universities can apply for the current income tax benefit (lowering the application threshold from 90 to 75 percent of income from education and science, updating the list of accounted activities).

6. Increase in the economic independence of universities through the transfer of authority to them for the current adjustment of financial management plans and the elimination of regulation of requirements for resources taken into account in the framework of co-financing of competitive projects of all types.

7. Development of centralized (and collective) investment tools to improve the quality of education through the creation of national digital platforms that provide:
- application by all universities of specialized online courses of other universities, including with appropriate methodological support;
- possibility of using proctoring for remote testing;
- access for all students and teachers to digital library resources (including foreign sources).

8. Implementation of the program of development of universities' digital educational environment, including modernization of digital infrastructure, means of remote work, and training of teachers and specialists.

9. Expansion of university science financing tools:
- introduction of universities' long-term research programs as a planning format for a state assignment (6 years with extension). The volume of state assignment for science in leading universities by 2024 should be at least 50 percent of the state assignment for education, by 2030 at least 100 percent;
- addition of a line of grants from the Russian Science Foundation with institutional grants for the development of the scientific potential of universities (100+ million rubles each, for a period of 5+ years);
- supplement of the structure of grants of the Russian Foundation for Basic Research with tools to support research teams (10+ million rubles each, for a period of 3+ years);
- introduction of grants to attract and retain scientists with internationally recognized results (compensation of university and research institute expenses for labor remuneration in the amount of up to 50 percent in Moscow and St. Petersburg and up to 100 percent in the regions; the size of the program is 1,500 world-recognized scientists);
- implementation of a support program for young researchers (including Russian postdocs);
- increase in the total volume of grant instruments to 12 percent of the budget of the State Program "Scientific and Technological Development of the Russian Federation" (from 6.5 percent in 2020).

Conclusion

The Covid-19 pandemic has been a true jolt for the higher education system of the Russian Federation and many other countries. Almost all universities have gained experience in extreme transition to working in a new format. One of the most notable areas of change has been the development of online educational designs. However, many other areas also required rapid revision: communication and work with students, research and research collaboration, organization of the environment, campus, and infrastructure, organization of university administration and management processes, and many other aspects of university life.

For most universities, such ultra-high-speed changes proved to be a major test of efficiency and modernity. The pandemic has created an urgent list of challenges for the development of all spheres of university life. On one hand, the previous problems became brighter, easier, and on the other, the tasks that seemed to be goals of the distant future a year ago became an immediate reality. If before the pandemic, universities could remain focused on operational issues, postponing digital, educational, research, and innovative transformation to a later period, then during the pandemic and looking ahead, the need for systemic change became apparent.

Since mid-summer 2020, concerns about the risks of the second wave of the pandemic have been more pronounced. This situation does not allow ignoring and postponing "for later" the detected points of strategic change. Each of the problems requires a solution, and such solutions require the participation of both the regulator and the entire university community. The active interaction and open communication of both sides during the pandemic have allowed the system to remain resilient.

Critical points of strategic growth include:
- systematic work on personnel development: advanced digital literacy of teachers and the introduction of modern educational

practices and technologies for the implementation of online learning models and mixed models;

▦ support for research and digital didactics projects, both in the use of digital tools and technologies and in a new training methodology, using integrated models that include both online and offline formats;

▦ remote research collaborations and communities, including those involving international cooperation, integration of domestic researchers into the global agenda of publications, joint projects, events;

▦ a system of support for students in mixed learning models to overcome inequalities and increase access to education, including in the field of new financial, technical, and methodological models for organizing the educational process;

▦ transformation of educational programs in providing conditions for the implementation of the 2+2 model and the introduction of new educational formats and practices aimed at increasing the interactivity of classes and the level of student engagement;

▦ digital infrastructure for the development of educational platforms, content, services for students and employees;

▦ management models that provide distributed and collective management methods: supervisory and management councils, flexible and project-based methods of managing a university;

▦ revision of regulatory models for monitoring and oversight activities.

Note that the list of strategic growth points is not limited to these.

To implement such vectors of development of the Russian higher education system, the story of a limited group of universities is not enough. A policy for the development of the entire network of higher educational institutions is necessary. The potential of such a system is to provide leadership both in world-class research and in the expansion of regional economies.

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