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THE ASSESSMENT OF THE EDUCATIONAL POTENTIAL OF THE REGIONAL POPULATION OF THE RUSSIAN FEDERATION

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Abstract. *Aim: This article covers an important subject – the assessment of the educational potential of the regional population of the Russian Federation. This is one of the most fundamental issues in modern society to be considered for the future development of Russia. The authors look at the concept of educational potential, systematize its key indicators, and perform an index analysis of factors that characterize educational activity and the technical, material, and informational basis of education in the Russian regions.*

Methodology: This article introduces a number of integrated components that characterize educational activities as well as the technical, material, and informational basis of education. A structured list of recommendations is provided for the implementation

of multidimensional regional classification, in line with both individual as well as broad indicators covered in the analysis.

Results: The regression model is based on an integral indicator that characterizes educational activity and defines the index of educational performance: the share of employed, higher-educated members of the population aged 25–64 years in the total number of economically active people of the same age group. Integral indicators characterizing educational activity and the technical, material, and informational basis of education were used in the benchmark analysis which defined leading and lagging regions in the Russian Federation. Based on these indicators, a multidimensional breakdown structure was developed to distinguish the weaknesses of other regions in relation to the leader.

Conclusion: These results may be useful for statisticians and economists for research on the level of informatization of the population and the economy.

Keywords*: education, expected and average period of training, cross-country comparisons, multidimensional grouping, population educational potential*

JEL Codes: *I25*

Introduction

Education is the most important driving force for progress in the socio-economic, scientific, and technological development of society. The "World Declaration on Higher Education for the 21st Century: Approaches and Practical Measures" (1998, Preamble) highlights that "on the verge of the 21st century we are witnessing an unprecedented demand for higher education and its wide diversification along with an ever-increasing awareness of its crucial importance for socio-cultural and economic development and creation of a future in which younger generations will have to master new skills, knowledge and ideas."

Education is a vital characteristic in examining human potential as it affects the quality of employment and, therefore, the development of the economy of any given country (Han, 2016).

According to a study by Blundell, Dearden, and Sianesi (2001), over the period of their work lives, employees with higher education on average receive bonus payments equal to 24% of their wages – equivalent to around 160,000 GBP (about 15.5 million RUB). The subject of the direct relationship between level of education and income of the population has also been raised in research by S. McKeen, J. Conlon, and S. Harkness.

In B. Knall's "Circle of Backwardness" concept, the author highlights that one of the reasons for economic backwardness lies in the poor level of the public education system and professional training development. Therefore, a country's development depends on focusing attention on these areas.

At the international level, special attention is paid to the research of education for many reasons, including the assumption that education level is part of the integrated assessment of a person's development level. The Human Development Index is published

annually as part of the UN development program, and its calculation is based on the following indicators: longevity, education, and standard of living using Gross National Income estimates. The above indicators are included in the Human Development Report. The list of characteristics of the education system for the 2010–2019 period has undergone significant changes (Wolff et al., 2014).

The following data was published for the reported period: average and expected time of training; number of the population with at least secondary education; and the non-profit education index.

In 2019, the list of indicators included into the report was affected by digitalization processes, and a few more were added to the publication of the corresponding year: "Percentage of primary and secondary schools with Internet access"; "Percentage of primary school teachers with profession-specific education"; "Student to teacher ratio"; and "International Student Assessment Program Grades in mathematics, reading and science" (Gromov et al., 2016).

One of the components of the Human Development Index covered by UN studies and presented in the Human Development Report is a consolidated educational quotient. The measuring range of this quotient is from 0 to 1, and the closer a value is to 1, the higher the level of education is in the country. The highest levels of expected study period were observed in the European countries and in Central Asia (14.6 years); however, the average number of years in this group of countries was 10.2. This group was also characterized by a high non-profit education index (0.682), while the student to teacher ratio was one of the lowest – 18 people (Woessmann & Hanushek, 2007).

The countries of Latin America and the Caribbean showed high levels of average and expected study periods (8.6 and 14.5 years, respectively). There was also a high level of non-profit education index (0.553), and 21 students per teacher in this group. Despite rather high levels of expected and average study periods, the gap between them was 5.9 years – hence we can say that the expectations of many students were not met (Hasaev & Bolgova, 2015).

The lowest rates for the average and expected study period were common for sub-Saharan African countries (5.7 and 10 years, respectively). The non-profit education index in this group of countries was 0.308, and the student to teacher ratio was 39 to 1 – which indicated a significant problem with staff in this region (Bakumenko & Kostromina, 2018).

The Russian Federation is not among the leading countries in terms of the educational quotient. In 2018, the average study period in our country was in 32nd place (12 years), compared to 77th place (8.8 years) in 2010. Analysis of the expected study period index amongst different countries for the 2010–2018 period showed that Russia was in 39th place (15.5 years) compared to 48th place in 2010 (14.1 years).

The Russian Federation did not participate in the 2010 UN research on the student to teacher ratio; however, in 2018 it was in 69th place with a ratio of 21 to 1.

The relatively weak position of Russia amongst other countries in terms of the consolidated educational quotient, as well as the extensive usage of the integral criterion in global practice, proves the importance of this research (Makarov et al., 2014).

1. Theoretical Aspects

The rating of the innovative development of the Russian Federation's constituent territories prepared by the Institute of Statistical Studies and the Economy of Knowledge of the National Research University "Higher School of Economics" was used as a basis for this study.

Since 2008, experts have calculated the rating of innovative development based on a number of components including "socio-economic conditions of innovative activity." In addition to macroeconomic indicators and the digital potential of the population, the indicated unit also includes characteristics of the educational potential of the population (Grezina et al., 2012).

Below is the list of indicators characterizing the educational potential of the regional population in the Russian Federation:

- the share of people aged 25–64 years with higher education in the total number of the population in this age group (%);
- the total number of university students – bachelor's degrees, specialist programs, or master's degrees – per 10,000 people (number);
- the share of students enrolled in programs specializing in mathematical and natural sciences, engineering, technology and technical sciences, or fundamental medicine in the total number of university students studying for bachelor's degrees, specialist programs, or master's degrees (%);
- the share of the economically active population aged 25–64 years who continuously upgrade their qualifications;
- the share of students enrolled in tertiary education mid-level training programs per 10,000 people (number);
- the share of students enrolled in tertiary education mid-level training programs specializing in mathematical and natural sciences, engineering, or technology and technical sciences (%).

It should be noted that the indicators used to characterize the population's educational potential emphasize the assessment of the development of innovation, and therefore only include indicators typical for particular areas such as engineering, fundamental medicine, etc. (Soloviev & Pestrikov, 2008).

The ranking published by the Institute for Statistical Studies and Economics of Knowledge subordinated to the National Research University "Higher School of Economics" determined the Tomsk region as a leader, showing the highest educational potential in terms of the number of university students per 10,000 people as well as the share of students enrolled in programs specializing in mathematical and natural sciences, engineering, or technology and technical sciences. Meanwhile, the Tomsk region occupies lower positions with regard to the number of people continuously upgrading their qualifications as well as the number of people with a university degree (11th and 32nd places, respectively) (Blundell et al., 2001).

It is worth noting that Moscow and Saint Petersburg have an unusually wide discrepancy regarding two indicators – the number of people continuously upgrading their

qualifications (1st and 3rd places, respectively) and the number of people with a university degree (72nd and 59th positions, respectively).

Given the significance of this study and the disproportionate levels of regional development, it seems necessary to configure an integrated evaluation of the educational potential of the population (Ferguson & Fernández, 2015).

2. Database and Methods

For the purpose of a comprehensive assessment of educational potential in the constituent entities of the Russian Federation, the authors introduce a multidimensional analysis with the application of two integral components: the "Index of educational activity" and the "Index of the material, technical, and informational basis of education", which in turn include the following indicators (Table. 1) (Wolska et al., 2019).

Table 1. *Index components.*

Title	Term
Index of educational activity	
Number of higher-education program students per 10,000 people (number)	$x_{1.1}$
Number of higher-education teaching personnel per 10,000 students (number)	$x_{1.2}$
Average grade in the SNE – State National Exam (state funded university places)	$x_{1.3}$
Average tuition cost, RUB	$x_{1.4}$
Index of the material, technical, and informational basis of education	
Educational organization floor area per 1 building, sq. m.	$x_{2.1}$
Share of students in dormitory accommodation in the total number of applicants, %	$x_{2.2}$
Share of computers used for educational purposes in the total number of PCs in higher-educational organizations, %	$x_{2.3}$
Share of educational organizations with distance learning programs in the total number of programs nationwide, %	$x_{2.4}$
Higher-education organizations' expenses on scholarships per student, thousand RUB	$x_{2.5}$

Source: *analytical database of Ministry of Science and Higher Education of the Russian Federation and the National Research University "Higher School of Economics" (www.minobrnauki.gov.ru, www.ege.hse.ru, accessed 9 March 2020).*

The indicator calculations provided in Table 1 are based on data from the following reporting forms, submitted by the Ministry of Science and Higher Education of the Russian Federation:

- • Form No. VPO-1 "Information about the higher education organizations offering bachelor's programs, specialty programs, and master's programs."
- • Form No. VPO-2 "Information on the material, technical, and information basis and the financial and economic activities of higher education organizations."

In addition to the forms listed above, we also used the data on the monitoring of the admission quality of Universities of the Russian Federation provided by the National Research University "Higher School of Economics".

In total for 2018, data on 84 constituent entities of the Russian Federation was used to complete this research. The Nenets Autonomous region was excluded from the analysis due to the lack of data on most indicators (Korshunov & Gaponova, 2017).

3. Research Findings: a Model of the Assessment of the Educational Potential of the Regional Population af the Russian Federation

3.1. Descriptive statistics

The methodology assigns a rating and is designed so that, in the initial stage, the database to be processed is generated. The main characteristics of the analyzed indicators are presented in Table 2.

Table 2. *The indicator values included in the integral evaluation of the educational potential of the regional population of the Russian Federation.*

Title	Lowest value	Highest value	Range of Dispersion	Median	CV, %
Number of students of higher-education programs per 10,000 people (number)	14	605	591	240	16
Number of higher-education teaching personnel per 10,000 students (number)	1	41	40	13	48
Average grade in the SNE – State National Exam (state funded university places)	49.7	78.0	28.3	64.5	8
Average tuition cost, RUB	66,985	269,055	202,070	114,199	29
Educational organization floor area per 1 building, sq. m.	1,472	9,035	7,563	4,766	28
Share of students in dormitory accommodation in the total number of applicants, %	5.4	100,0	94,6	91.8	19
Share of computers used for educational purposes in the total number of PCs in higher-educational organizations, %	26.5	91.1	64.6	67.2	16
Share of educational organizations with distance learning programs in the total number of programs nationwide, %	0.00	16.58	16.58	0.76	64
Higher-education organizations' expenses on scholarships per student, thousands RUB	16,779	94,803	78,024	46,107	25

This calculation was based on data from the analytical database of the Ministry of Science and Higher Education of the Russian Federation and the National Research University "Higher School of Economics" (www.minobrnauki.gov.ru, www.ege.hse.ru, accessed 9 March 2020).

Based on the variation coefficient values given in Table 2, most of the regions of the Russian Federation are similar in the majority of indicators. The only exceptions are the number of higher-education teaching personnel per 10,000 students and the share of educational organizations with distance learning programs in the total number of programs nationwide (with variation coefficients of 48% and 64%, respectively) (Kapelushnikov, 2016).

At the same time, it can be observed from the majority of indicators included in the integral assessment of the educational potential of the regional population of the Russian Federation that the median divides constituent entities into two separate groups. This means that when we look at the number of higher-education program students per 10,000 people, the indicators vary by 226 people in the first group (from 14 to 240 people per 10,000 people) to 365 people in the second (from 240 to 605 people per 10,000 people).

The first group consolidates regions with indicator values lower than the median; the second with indicator values greater than the median (Klucharev, 2008).

There is a significant lag between the leading Krasnoyarsk region (with 605 people) and the rest of the regions in the second group – i.e., Moscow and Saint Petersburg (with more than 550 people) and the Tomsk region (with more than 540 people). The lowest number of students per 10,000 people was in the Yamalo–Nenets region (14 people)

The number of higher-education teaching personnel per 10,000 students in the first half of the regions varied from 1 to 13 per 10 students, while in the second half it equaled 28 people. The highest number of teaching personnel was in Saint Petersburg (with 41 people), Moscow (38), and the Tomsk (37), Volgograd (36), and Rostov (30) regions. In 26 regions, this value did not exceed 10 teaching staff per 10,000 students. It is not by coincidence that this particular indicator demonstrated such a wide variation across the regions.

The highest average State National Exam results were in Moscow (78 points), Saint Petersburg (76.9), the Tomsk region (74.6), the Republic of Tatarstan (73.2), the Novosibirsk region (71.2), and the Sverdlovsk region (70.7). The lowest was recorded in the Magadan region (49.7).

It should be noted that all of the above indicators demonstrate great variation across all of the regions of the Russian Federation. As an example, we can take the share of students in dormitory accommodation in the total number of applicants, which ranged from 5.4% to 100% in 2018. The lower number was recorded in the Chechen Republic, and 100% was recorded in 15 other regions.

It is important to note that tuition costs varied significantly across the regions. For instance, the lowest fee in 2018 was 66,985 RUB (the Republic of Kalmykia) and the maximum fee was 269,055 RUB (the Republic of Sakha, Yakutia). Notwithstanding high variation in the range of dispersion, the coefficient of variation that characterizes the homogeneity of the regions was within the norm (Heckman & Kautz, 2013).

In half of the regions, average tuition costs did not exceed 114,200 RUB. The lowest cost of education was in Belgorod (85.3), Kostroma (96.6), Pskov (96.6), the Altay region (97.4), the regions of the North Caucuses Federal District (79.8 – 99.4), and the Republic of Mari El (95.1).

The highest tuition costs were in the Republic of Sakha (Yakutia) (more than 200,000 RUB), the Khanty–Mansiysk Autonomous District, Moscow, and the Sakhalin Region.

Significant lags between the indicators included in the index of the technical, material, and informational basis of education can be observed in two groups: the share of students in dormitory accommodation in the total number of applicants ($x_{2.2}$), and the share of educational organizations with distance learning programs in the total number of programs nationwide ($x_{2.4}$). The first half of the regions indicator ($x_{2.2}$) showed significant variation from 5.4% to 91.8%, although it should be noted that 5.4% is a rather exceptional case which came from the Chechen Republic – the rest of the regions from the first group illustrated variations between 37.4% and 91.8%.

The share of students in dormitory accommodation in the total number of applicants in the second group of regions varied from 91.8% to 100%.

The share of educational organizations with distance learning programs in the total number of programs nationwide had an overall low indicator level across the country, and in half of the regions did not exceed 0.76%. In the entire 73 regions of the Russian Federation, its level was lower than 2% (Bondarenko, 2017).

In the present conditions of higher education organizations managing to continue the educational process by using distance learning technologies, it has become obvious that such programs are a necessity and a modern reality (Kuzjmonov, 2018).

3.2. The standardization of the data.

After all of the statistics of the regions were collected, data was normalized to secure its homogeneity and compatibility:

$$x'_{ij} = \frac{x_{ij} - x_{ij\,\min}}{x_{ij\,\max} - x_{ij\,\min}}, \quad (1)$$

where x'_{ij} – normalized value of the indicator i for the region j;
x_{ij} – value of the indicator i for the region j;
$x_{i\min}$ and $x_{i\max}$ – are the minimum and maximum values of the indicator i across regions (Rubin & Wright, 2017).

3.3. The calculation of indexes of educational activity and the material, technical, and informational basis of education.

The next step was the calculation of the (larger) components of the educational potential index. The following formula determines the mathematical average of the normalized values of a number of indicators:

$$I_{kj} = \frac{\sum x'_{ij}}{n_k}, \quad (2)$$

where I_{kj} – value of index component k for the region j;
n_k – number of indicators included into the index component k.

The calculated results of the aggregate indicators allowed for leading and lagging regions to be disclosed according to the educational activity index and the index of the material, technical, and informational basis of education. If several regions had similar index values, they were assigned equal seniority.

Table 3 provides a list of the leading regions pursuant to the larger component values of the integral evaluation of the educational potential of the regional population.

Table 3. *The regions of the Russian Federation with the highest levels of components which generated the country's educational potential in 2018.*

Ranking	Educational activity index	Index of technical, material, and informational basis of education
1	Moscow	Moscow
2	Saint Petersburg	Saint Petersburg
3	Tomsk region	Novosibirsk region
4	Krasnodar region	Krasnoyarsk region
5	Volgograd region	Kemerovo region
6	Moscow region	Khanty–Mansi Autonomous Area
7	Rostov region	Transbaikal region
8	Republic of Tatarstan	Mari El Republic
9	The Republic of Sakha (Yakutia)	Primorsky District
10	Sevastopol	Republic of Karelia

Source: *the same as under Table 1.*

The regions of the Southern Federal District (Sevastopol and the Krasnodar Krai, Volgograd, and Rostov regions) are among the main leaders in the value of the index of educational activity. As for the composition of the group of leaders in terms of the index of the material, technical, and informational basis of education, it mainly includes the subjects of the Siberian and Far Eastern Federal Districts.

Moscow and Saint Petersburg were the leaders in both the educational activity index and the index of the material, technical, and informational basis of education (1st and 2nd place in both indicators, respectively). What is most interesting is that the structure of the leader regions taking places 3rd to 10th diverges completely. As an example, we can look at Sevastopol, which ranks 10th in the educational activity index value and 83rd in the index of the material, technical, and informational basis of education (Table 4) (Bobkov & Gulyugina, 2012).

Table 4. *The regions of the Russian Federation with the lowest values of components which determined the educational potential of the population in 2018.*

Ranking	Educational activity index	Index of the material, technical, and informational basis of education
75	Altai Republic	Republic of Crimea
76	Kabardino–Balkarian Republic	Kamchatka region
77	Novgorod region	Yamal–Nenets Autonomous Region
78	Vologodskaya region	Leningrad region
79	Magadan region	Jewish Autonomous Region
80	Kostroma region	Sakhalin region
81	Kurgan region	Pskov region
82	Chechen Republic	Republic of Adygea
83	Astrakhan region	Sevastopol
84	Jewish Autonomous Region	Chechen Republic

Source: *the same as under Table 1.*

The structure of the regions that lagged the most in the value range of larger components also varied significantly. The subjects of all federal districts were represented (with the exception of the Volga region) among the 10 regions with the minimum values of the educational activity index. As for the lagging subjects in terms of the index of the material, technical, and informational basis of education, the subjects of the Southern and Far Eastern Federal Districts predominated in this group.

The fact that in the Far Eastern Federal District there are subjects who fell into the group of both the maximum and minimum values of the index of the material, technical and, informational basis of education allows us to conclude the heterogeneity of subjects in this district.

Entities like the Chechen Republic and the Jewish Autonomous Region were amongst the 10 regions with the lowest values of the examined indicators. Thus, the Chechen Republic is 82nd by the index of educational activity, and 84th by the index of the material, technical, and informational basis of education. The Jewish Autonomous Region is 84th and 79th, respectively.

Therefore, vastly disproportionate results were revealed, indicating that components which configure regional educational potential vary significantly by levels of development, which in turn affects the general assessment of general educational potential.

To evaluate the results of educational activities, we examined the correlation between the educational activity index and the share of the employed population aged 25–64 years with higher education in the total number of the employed population in the corresponding age group (Leongardt, 2012).

The indicator of the level of education of the population assessed by the proportion of people aged 25 to 64 years with higher education in the total number of this age group

demonstrates a fairly high level of variation across the regions of the Russian Federation. The lowest percentage of people with higher education was 23.6% in the Jewish Autonomous Region, and the maximum value of 50.2% was recorded in Moscow. However, in half of the regions the proportion of the population with higher education was less than 32.6%

The largest proportions of the population with higher education (more than 40%) were encountered in only 8 regions: Moscow (50.2%), St. Petersburg (44.3%), Sevastopol (43.9%), the Moscow region (42.4%), the Yamalo–Nenets Autonomous Region (47.4%), and the Republics of North Ossetia–Alania (44.8%), Karachay–Cherkess (43.7%), and Kalmykia (42.1%). A greater number of regions (51 in total) demonstrated variation between 30% and 40%.

Therefore, it would be valid to raise the question of how much influence the components flagged in this research have on the regional level of education.

Correlation analysis between the index of educational activity and the share of the employed population aged 25–64 years with higher education in the total employed population of the corresponding age group showed a direct and moderate correlation ($R = 0.349$). The results were significant at $p < 0.05$ (Evirgen, 2016).

The general linear regression model that includes all of the regions of the Russian Federation allowed us to track and predict the share of employment of those aged 25–64 years with higher education, using the components included in the indicator of educational activity.

The statistical adequacy of the regression model ($\hat{Y} = 27{,}98 + 13{,}69x$) is supported by the following factors: the significance check shows that the null hypothesis was not rejected with a probability of 0.95 ($F = 11.37$, $Se = 5.06$). The determination coefficient was 0.121. This means that 12.1% of the variation in the share of the employed population aged 25–64 years with higher education in the total employed population of the corresponding age group (Y) is explained by the factors included in the educational activity indicator (X). The calculated coefficient of elasticity allows us to conclude that with a 1% increase in the level of educational activity, the share of the employed population aged 25–64 with higher education in the total number of the employed population will increase by 15.8% (Yahontova, 2014).

The creation of universities with special status and with special funding from the federal budget was one of the elements of the strategy of the educational policy of the Government of the Russian Federation. As a result, a network of federal universities was created. Of course, this has had a positive impact on the level of education in the regions. This is due to the fact that federal universities have formed methodological materials for the development of innovative educational programs, as well as modernized the educational process. In addition, these universities actively organize networking with other educational organizations, as well as with scientific institutions and business partners, in order to form joint programs and to solve important problems of the socio-economic development of the regions (Dill & Soo, 2005).

There were 10 federal universities and 29 national research universities in Russia in 2019 which were allocated in the regions as follows: the largest number of universities in

this category was concentrated in the Central, Volga, and Siberian federal districts; Moscow is a leader, as it has the largest number of educational organizations (11); the rest of the country has one national or federal university per region.

The results of the calculation of the index of educational activity and the index of the material, technical, and informational basis of education allowed leading and lagging regions to be identified (Smirnov, 2013).

3.4. Classification of the regions of the Russian Federation

Regions were categorized into groups in line with the difference between the leader and the rest of constituent entities in terms of the educational activity index value (Table 5).

Table 5. *Classification of the regions of the Russian Federation according to the lag between the leader (Moscow) and other regions in the index value in 2018.*

Index value lag between the leader and other regions, %	Number of regions	Regions
Up to 40	4	Saint Petersburg Regions: Tomsk, Volgograd Krasnodar region
40–50	8	Regions: Moscow, Rostov, Novosibirsk, Tyumen, Oryol Republics: Tatarstan, Sakha (Yakutia) Sevastopol
50–60	24	Khabarovsk District Regions: Voronezh, Samara, Kursk, Sverdlovsk, Nizhny Novgorod, Saratov, Chelyabinsk, Yaroslavl, Omsk, Kaliningrad, Ryazan, Irkutsk, Smolensk, Leningrad Primorsky, Stavropol, Kamchatka, Krasnoyarsk Republics: Mordovia, North Ossetia–Alania, Adygea, Kalmykia Khanty–Mansi Autonomous Area
60 and more	47	Republics: Bashkortostan, Karelia, Karachay–Cherkess, Buryatia, Tuva, Chuvash, Dagestan, Ingushetia, Mari El, Udmurtia, Komi, Khakassia, Crimea, Altai, Kabardino–Balkaria, Chechen Regions: Belgorod, Ulyanovsk, Arkhangelsk, Kaluga, Orenburg, Ivanovo, Tula, Penza, Amur, Sakhalin, Tambov, Kirov, Tverskaya, Murmansk, Lipetsk, Vladimir, Pskov, Kemerovo, Bryansk, Novgorod, Vologda, Kostroma, Astrakhan, Jewish Autonomous Perm, Altai, Transbaikal Districts: Yamal–Nenets Autonomous, Chukotka Autonomous

Source: *the same as under Table 1.*

The first group, with a minimal difference between their educational potential index value and that of the leader region (Moscow), included only four regions, together with St. Petersburg.

The second group – with a lag of 40–50% – consisted of 8 entities, not including the North–West and North Caucasian federal districts (Kolomak, 2008).

The group with a lag of 50 to 60% consisted of regions that represent different federal districts. A large proportion (37%) of the 24 regions were part of the Central and Volga Federal Districts.

The third group, with a severe difference between their educational potential index values and that of the leader region, included 47 entities, 10 of which are part of the Central Federal District and 9 of which are part of the Far Eastern Federal District.

Table 6. *The classification of the regions of the Russian Federation in 2018.*

Federal district	Classification per difference in index value with the leader region, %				Total
	Up to 40	40–50	50–60	60+	
Central	-	2	5	10	17
North–West	1	-	2	5	10
Southern	2	2	2	2	8
North Caucasian	-	-	2	5	7
Volga	-	1	4	9	14
Ural	-	1	3	2	6
Siberia	1	1	3	5	10
Far East	-	1	3	7	11
Total	4	8	**24**	**47**	83

Source: *the same as under Table 1.*

Most regions that fell behind the leader region (Moscow) by 60% or more were part of the North Caucasian, Volga, and Far East Federal Districts.

Let us examine the regional breakdown according to the difference in the value of the index of the material, technical, and informational basis of education with the leader region.

As for this index, Moscow also demonstrated the highest scores and was again used as a basis for comparison. Similarly to the results for the index of educational activity, analogous intervals were selected to compare the outcomes of the two indexes (Tsomartova, 2010).

Table 7. *The classification of the regions of the Russian Federation by level of difference in the value of the index of the material, technical, and informational basis of education with the leader region (Moscow) in 2018.*

Index value lag between the leader and other regions, %	Number of regions	Regions
Up to 40	62	Saint Petersburg Regions: Novosibirsk, Kemerovo, Murmansk, Samara, Moscow, Tomsk, Ivanovo, Arkhangelsk, Voronezh, Belgorod, Sverdlovsk, Lipetsk, Kurgan, Tyumen, Oryol, Omsk, Smolensk, Ryazan, Bryansk, Tver, Amur, Tambov, Rostov, Volgograd Kaluga, Kostroma, Penza, Novgorod, Chelyabinsk, Tula, Irkutsk, Kirov, Kursk, Orenburg, Nizhny Novgorod, Yaroslavl, Kaliningrad, Saratov, Vladimir Krasnoyarsk, Transbaikal, Primorsky, Altai, Perm, Krasnodar, Stavropol, Khabarovsk Districts: Khanty–Mansi Autonomous, Chukotka Autonomous Republics: Mari El, Karelia, Bashkortostan, Tatarstan, Chuvash, Mordovia, Sakha (Yakutia), Udmurt Republic, Tuva, Komi, Khakassia
40–50	16	Republics: Ingushetia, Kalmykia, Altai, Buryatia, Kabardino–Balkaria, North Ossetia–Alania, Dagestan, Karachay–Cherkess, Crimea Regions: Astrakhan, Magadan, Ulyanovsk, Leningrad, Jewish Autonomous Kamchatka Krai Yamal–Nenets Autonomous Region
50–60	5	Regions: Sakhalin, Pskov Republics: Adygea, Chechen Sevastopol

Source: *the same as under Table 1.*

Only 3 intervals are present in Table 7. The first group (with a lag of up to 40%) included 62 regions, the largest number of which (48%) are part of the Central (17) and Volga (13) federal districts.

The second group – with a lag of 40–50% – included 16 regions, 5 of which are part of the North Caucuses federal district.

The most disadvantaged group, with the maximum difference between its index value and that of the leader region, included only 5 regions.

Table 8. *The classification of the Russian Federation regions in 2018*

Federal district	Classification per index value difference with the leader region, %			Total
	Up to 40	40–50	50–60	
Central	17	-	-	17
North–West	8	1	1	10
Southern	3	3	2	8
North Caucasian	1	5	1	7
Volga	13	1	-	14
Ural	5	1	-	6
Siberia	9	1	-	10
Far East	6	4	1	11
Total	**62**	**16**	**5**	83

Source: *the same as under Table 1.*

This analysis made it possible to identify regions with an equally high level of both educational activity and the development of the material, technical, and informational basis of education. These are the St. Petersburg, Tomsk, and Volgograd regions and Krasnodar Krai. It is recommended to use the successful experience of these regions in the formation of education policy (Frolich et al., 2010).

It should be noted that even though the above indexes are related to the same field of study, they nevertheless characterize different components, making it impossible to combine them into one integral indicator at this stage.

Conclusion

The research outcomes of the study of regional ratings can become a basis for the development of differentiated measures aimed at stimulating the progress of educational potential, as well as monitoring the implementation of regional programs for the advancement of education.

The constructed regression model will make it possible to predict in each individual region the change in the share of the employed population aged 25–64 with higher education in the total number of the employed population by using a predictor – the level of educational activity, which includes various components. It is necessary to take into account the situation of the subjects of the Russian Federation in terms of the level of development of the factor trait, and to change its value in each individual region. This can be achieved by carrying out comprehensive social and economic measures to improve the indicators included in the index, thereby adjusting the overall level of educational activity in the country (Bolli & Somogyi, 2011).

The individual review of each index will help to identify problem regions using individual characteristics of the education system. Each index, individually or in a group of

indicators, can affect individual components of the education system, which will allow the Ministry of Education and Science to respond more quickly to problems in this area in each region (Anikina et al., 2014).

In the context of an extremely innovative economy and a knowledge-based society which draws on the increasing use of information and communication technologies, the role of higher education organizations becomes particularly significant in ensuring all sectors of the economy have a supply of highly qualified personnel. Universities play an important role in the process of the formation of the political and scientific elite and the moral climate in society, and therefore the enhancement of educational potential should be subject to the close attention of state and regional governments.

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