The Impact of Educational Indicators on Success in Afterschool Life
Regional Data-Based Analysis

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Abstract. The recent years have seen a growing interest in comparative research of regional education systems, driven by the opportunity to set new analitical goals as well as the education policy needs. Studies in this field predominantly focus on comparing the learning outcomes and equality of access to education across regions. This paper investigates the relationship between regional educational indicators and success of secondary graduates in afterschool life, the latter being measured as a percentage of the total number of people in the corresponding age group who are not in education, employment or training (NEET). Correlation analysis controls for the influence of external socioeconomic factors, such as gross regional product per capita and urbanization level, on educational indicators.

Correlation and regression analyses are applied to educational indicators, socioeconomic indicators and NEET rates across the regions of Russia. The NEET rate shows a statistically significant relationship with the indicators describing participation in education, organization of learning process, learning environments, resources and funding involved, and the teaching staff structure. A no less important finding is the evidence of no relationship between success of secondary graduates in afterschool life and a number of educational indicators playing an essential role in Russia's current education policy.

Data presented in this study may serve the basis for developing regional education policies; it should not be used for evaluating, let alone ranking, regional education systems.

Keywords: secondary education, secondary vocational education, educational indicators, regional education systems, NEET, correlation analysis.

Despite the broad range of topics in modern educational research, relatively little attention has been given to analysis of regional education systems. For quite a long time, researchers were mainly focused on variations in learning outcomes and equality of access to education. The recent years have seen a growing interest in the distribution of au-

thority among different levels of educational administration (national, regional and municipal) [De Groof, Yankevich 2019]. More and more countries participate every year in the international comparison of variations in key education statistics among subnational jurisdictions, administered by the OECD since 2015 (25 countries in 2019 [OECD2019], as compared to 10[1] in 2015), which is yet another piece of evidence for the increased attention to regional education systems.

Opportunities of subnational education system analysis are not restricted to exploring the relationship between education management organization in federative states and their learning outcomes achieved at the level of regions. This type of analysis also allows raising questions about the mutual influence of socioeconomic and other characteristics of regions as well as the structure of regional education systems, on the one hand—and learning outcomes, resources available and other educational indicators, on the other hand. In particular, a statistically significant correlation was found between USE[2] performance and the level of extracurricular education system development in regions [Agranovich 2014].

This study is an attempt to find the relationship between educational indicators and the outcome of regional education systems using regional statistics. It does not seek to evaluate, let alone rank, the regional education systems; instead, the goal is to identify trends and relations and to understand which educational indicators have an impact on learning outcomes and to what extent. Regional statistics represent a suitable empirical basis for this type of research, being homogeneous and extensive enough to allow for accurate statistical analysis.

The key questions in educational research are: how do people, society and economy benefit from education, and what are the factors that affect learning outcomes? Correlations between education and its end-user outcomes have been analyzed in a number of studies attempting to find the dependence between education system characteristics and socioeconomic indicators. Studies like that are difficult to conduct, first of all because learning outcomes represent delayed effects, i. e. it takes a period of time for them to manifest. Second, a myriad of factors other than education have an influence on performance of an individual, economy and society—the longer the time lag, the harder it is to measure the specific impact of education on this or that socioeconomic indicator.

As a result, in the overwhelming majority of cases, it is not the end effects of education that researchers focus on but the intermediate within-system performance, such as student achievement measured by national and international assessments, equality of access to edu-

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[1] https://nces.ed.gov/surveys/annualreports/oecd/
[2] Unified State Exam

cation on various grounds, educational attainment statistics, etc. This approach is based on the assumption that higher levels of educational attainment, better access to education, etc. are related to greater external effects of education. However, a number of studies, including some of ours [Agranovich 2017], show that this is far from being always true.

This paper aims at identifying the education system indicators related to socialization of secondary and vocational school graduates, the latter being measured as a percentage of the total number of people in the corresponding age group who are not in education, employment or training (NEET). Widely used in global statistics, the NEET rate relies on a tried-and-true method of calculation and allows monitoring long periods of time.

Certainly, NEET rate is a multifaceted phenomenon, and a number of social, economic, ethnic, regional and other factors are associated with young people's risk of becoming NEET [Zudina 2018]. This study only seeks to find a relationship between the NEET rate for people aged 15–24 and education system indicators. The indicators that were found to be significantly related to the NEET rate explain 74% of variation in NEET rates across the regions of Russia. Now, of course, such indicators as the percent of early school leavers have social roots in the first place. Yet, initiatives to retain students from disadvantaged families in school are quite realistic and may decrease the likelihood of such students becoming NEET later on.

Likewise, socialization and afterschool success of graduates are not limited to employment and post-secondary education but will be difficult to achieve without these two. Allowance is made for these limitations when interpreting the NEET rate as an indicator of socialization and success of secondary and vocational school graduates in this study.

1. Research on Regional Education Systems in Russia and Abroad

There are three major trends in research on regional education systems: analysis of variation, comparative assessment, and searching for correlations between the learning outcomes and the potential or operating conditions of regional education systems. Within the scope of this study, it is critical to understand which indicators are selected for analyzing regional education systems. For this purpose, the indicators used in relevant literature are divided into three categories, depending on whether they describe (a) the output of an education system, (b) its current state and potential, or (c) its operating conditions.

The OECD's survey of variation in education systems examines such indicators as educational attainment, employment by age and educational attainment, organization of teachers' working time, teachers' salaries, participation in preschool, primary and secondary education, education spending, etc. [OECD2016; 2019]. An essential limitation of the OECD's cross-country comparisons is that they make

no allowance for differences in purchasing power of national currencies [Agranovich 2017]. Not only does this flaw make comparison of financial indicators largely meaningless but it also makes it much more difficult to analyze the causes of variation in other indicators, as education spending is a critical predictor in comparing the output of regional education systems.

In addition to the annual global survey mentioned above, the OECD has also administered a number of regional education system assessments in some countries, such as Portugal [Santiago et al. 2012] and New Zealand [Nusche et al. 2010].

An attempt to carry out a comprehensive assessment of municipal education systems was made in Novosibirsk Oblast [Zakhir 2015]. The methodology proposed suggests ranking all municipal systems according to a variety of indicators with subsequent comparison. Performance indicators of municipal secondary school systems are grouped into four categories: quality of graduates' learning outcomes, socialization of children and adolescents, access to secondary and extracurricular education, protection and promotion of students' health. All the indicators except youth crime rate are endogenous to the education system and reflect either its current state or the results of national graduation examinations.

A similar ranking-based method of comparing municipal education systems was used by Alexandra Shabunova and Maksim Golovchin [2012]. This approach allows revealing individual strengths and weaknesses of municipal education systems but requires much analytical work to be done afterwards to understand the reasons behind success or failure of any specific system.

Correlations between educational indicators and the output of education systems have been explored in a number of studies [Agranovich 2014]. One of them uses average USE scores "as a performance (output) target for a secondary education system and an indicator of its effectiveness" [Filippova, Vysotskaya 2018]. Models proposed by its authors use a broad range of indicators grouped into three categories: demography, secondary education, and regional economy and infrastructure. Nine indicators are classified as demographic: educational attainment, income level, crime rates (including youth crime), urbanization level, migration characteristics, and some others. The secondary education category includes 14 indicators, from relative teacher pay to the proportion of night schools in the total number of secondary schools in the region. The third category, "regional economy and infrastructure", comprises seven indicators, from gross regional product (GRP) per capita to the number of public buses per 100,000 people. The choice of indicators in this paper appears to be insufficiently substantiated and raises some reasonable questions.

The majority of studies in Russia and abroad uses student achievement as a key indicator of regional education system performance and sometimes effectiveness, too; factors of such assessments usu-

ally include various within-system educational characteristics. Rare exceptions from this mainstream trend are represented by studies examining subnational education systems in Spain and Turkey.

Using a geomatic and cartographic approach, Rufino Pérez-Gómez and Aurelio Aragón-Velasco [Pérez-Gómez, Aragón-Velasco 2016] evaluate relations between some education variables and socioeconomic indicators across the regions of Spain. Their method allows them to illustrate a number of relations, reported earlier in literature, between various indicators, such as socioeconomic status of family, and students performance in PISA. More importantly for the purpose of the present article, they also analyze the relationship between such educational indicators as repetition and early school leaving rates, educational attainment and PISA performance, on the one hand, and economic development, unemployment rate and unemployment dynamics in the region, on the other hand. While involving PISA results in their calculations, the authors use the shares of low and top performers instead of average scores, i. e. differentiation of student' achievement in the region instead of the average level.

A study of cross-regional differences in the education systems of Turkey [Tomul 2009] measures regional inequality of access to education using the education Gini index [Vinod, Yan, Xibo 2001], which is calculated here based on the average years of schooling of the population at the age of 25 and over.

Inequality of regional education systems has been analyzed using the average number of years of education and the Gini coefficient in a number of other studies as well, including the well known article by Amparo Castelló and Rafael Doménech [Castelló, Doménech 2002]. Important findings have been obtained by Petra Sauer and Martin Zagler [Sauer, Zagler 2014] who showed that inequality is related to economic growth for countries with low education attainment of population, whereas highly educated countries exhibit a statistically insignificant negative correlation between inequality and economic growth.

As we can see, studies that target regional (cross-regional and cross-municipal) education system differences mostly use student achievement measured by national or international assessments as a key indicator for evaluating regional education systems. The greatest emphasis is placed on relations between cross-regional inequality in access to education and variation in learning outcomes. The recent years have seen a growing interest in exploring the relationship between educational and socioeconomic indicators, the former ones being represented most often by the average years of schooling and educational attainment.

Unlike in Russia, international studies are not designed to evaluate regional education systems, let alone the quality of their management.

2. Research Methodology, Tools and Data Sources

This paper presents results of a cross-regional comparative analysis. Our study was not designed to evaluate, let alone rank, regions. Instead, its purpose was to find relations between education system characteristics and socialization of secondary and vocational school graduates. Regional-level indicators were used to achieve this goal as they allow building a large dataset for statistical analysis.

Solving the research problem implied the following successive steps: (i) selection of education system indicators, (ii) selection of socioeconomic indicators reflecting the operating conditions of regional education systems, (iii) analysis of relations between the educational and socioeconomic indicators of regions to be controlled for in subsequent calculations, and (iv) statistical analysis of relations between the educational indicators and socialization of graduates measured through the NEET rate.

This cross-regional analysis of education systems was limited to secondary and vocational education levels. Tertiary education was not included—first of all, because education statistics provide no information on college students' home regions. As a result, regional tertiary enrollment rates only reflect the ratio of education system capacity to the total population in the typical age of tertiary education in the region. Given that universities are distributed extremely unevenly among the regions of Russia, regional participation rates may sometimes be above 100% or tend to zero. This leads to impossibility of linking the indicators of regional tertiary education systems to graduates' position in the labor market, which is required for NEET rates to be calculated accurately. In addition, university graduates account for 9% of the age group analyzed (aged 15–24) and thus cannot have any significant influence on regional NEET rates. At the same time, availability and size of the tertiary education system in a region have an impact on the whole education system, so we use this data as a background factor in this study.

The following types of indicators were analyzed:

1) Reflecting the output of education systems;
2) Reflecting the resources, size and potential of education systems;
3) Reflecting the operating conditions and growth opportunities of education systems;
4) Socioeconomic characteristics of regions;
5) Auxiliary coefficients and indices.

All the indicators were analyzed across the regions of Russia as well as at the national level.

The first category comprised only one indicator, the share of people not in education, employment or training (NEET). It was analyzed separately for two age groups, 15–19- and 20–24-year-olds. Data for

calculations was obtained from statistical accountability forms OO-1 and SPO-1[3] as well as the results of the Labor Force Survey[4].

The second group includes indicators assessing the performance of institutions of elementary, secondary, vocational, tertiary and extracurricular education. They reflect the following:

• Enrollment, entrance and graduation rates;
• Structure and relative level of education spending;
• Structure of teaching staff by educational attainment, years of teaching experience and age;
• Teacher workload: average class size and student–teacher ratio;
• Teachers' salaries;
• Technology infrastructure of educational institutions; use of ICT in education.

Along with the abovementioned statistical accountability forms monitoring the performance of educational institutions, this study also makes use of statistical monitoring forms OO-2, DO-1 and SPO-2[5], the Federal Statistical Monitoring of Salaries for Some Categories of Social Service and Scientific Workers[6] and the Federal Treasury's budget execution reports[7].

The third category (characteristics of the operating conditions and growth opportunities of education systems) features the following indicators:

• Structure and size of the networks of institutions of extracurricular, and tertiary education;
• Availability of cultural institutions;
• Level of ICT infrastructure development.

These indicators were calculated using culture statistics, the results of the Federal Statistical Monitoring on the Use of Information Technology and ICT Networks and the Monitoring of Information Society Development.

The fourth category (socioeconomic characteristics of regions) includes the following:

• Gross domestic/regional product per capita;
• GDP/GRP structure;
• Unemployment rate;

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[3] https://edu.gov.ru/activity/statistics
[4] https://www.gks.ru/bgd/free/B99_10/IssWWW.exe/Stg/d030/i030110r.htm
[5] https://edu.gov.ru/activity/statistics
[6] https://www.gks.ru/free_doc/new_site/population/trud/itog_monitor/zarplata.html
[7] http://roskazna.ru/ispolnenie-byudzhetov/

- Population density;
- Population structure by place of residence.

These indicators were calculated based on publications of the Federal State Statistics Service (Rosstat).

Finally, the fifth category comprises auxiliary coefficients and indices necessary to ensure comparability of data, financial in the first place:

- Budget expenditure index (BEI);
- Living wage;
- Coefficient of population distribution;
- GDP/GRP deflator.

The budget expenditure index is calculated annually by the Ministry of Finance and published on their official website[8]. The other indicators were calculated using the annual statistical book on the regions of Russia [Rosstat 2019] and Rosstat's official website[9].

3. Key Findings

3.1. Relations between educational indicators and socioeconomic characteristics of the region

Finding relations between education system indicators and socioeconomic characteristics of regions is necessary to make allowance for socioeconomic factors when analyzing the relationship between educational indicators and success in afterschool life.

Correlation analysis revealed an impact of external factors—GRP per capita and urbanization rate—on a number of indicators describing participation in education, education spending, organization of learning process, the structure of teaching staff and teacher workload.

GRP per capita and urbanization were found to be interrelated (correlation coefficient = 0.45), so interaction effects between these factors and educational indicators were removed prior to analyzing the relations between them.

Analysis results are presented in Table 1, which shows correlations—with coefficients higher than 0.35 (absolute value) and significance levels of $p < 0.001$—with at least one external parameter.

Analysis of relations between educational indicators and socioeconomic characteristics of regions was complementary in this study, but some of its results deserve attention and further research. One of such findings is that educational indicators—except resource-related ones—were found to be related stronger to urbanization rate than to GRP per capita. Another finding is that the share of private sources in overall education spending is higher in relatively poor regions than in those that are more economically developed. This is quite in

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[8] https://www.minfin.ru/ru/?fullversion=1
[9] gks.ru

Table 1. **Correlations between educational indicators, on the one hand, and GRP per capita and urbanization rate, on the other hand**

Educational indicator	GRP per capita (Pearson's r)	Urbanization rate (Pearson's r)
Participation in education (access to education)		
Gross enrollment ratio for upper secondary, general programmes	(*)	0.40
Gross enrollment ratio for upper secondary vocational programmes	(*)	0.43
Upper secondary (general) completion rate	(*)	0.54
Organization of learning process; conditions of learning		
Class size in upper secondary	0.45	0.60
Average class size	0.37	0.46
Share of students attending low secondary school in the morning	(*)	0.36
Number of students per teacher in primary school	(*)	0.42
Number of students per teacher in secondary school	(*)	0.48
Resources and funding involved		
Number of personal computers with access to the Internet	0.52	0.38
Spending on secondary education	0.48	(*)
Share of education spending going to salaries	(*)	-0.36
Education spending per student in rubles, adjusted for BEI	0.56	0.36
Education spending per student as a percentage of GRP per capita	-0.68	-0.54
Share of private expenditures in education spending	(*)	-0.41
Share of capital expenditures in education spending	0.48	(*)
Average monthly teacher salary, adjusted<FootnoteStart:>Keeping in mind the considerable variation in consumer prices across the regions of Russia, teacher salaries were adjusted for the price of fixed consumer basket in every region.<FootnoteEnd:>	73.6	0.57

Note: (*)—no statistically significant correlation is observed.

line with the global trend: governments of developed countries tend to spend more on education than governments of low- and middle-income economies in both absolute and relative terms [Agranovich, Yermachkova, Seliverstova 2019].

Figure 1. **Correlation between participation in vocational programs at the level of upper secondary education and the NEET rate**
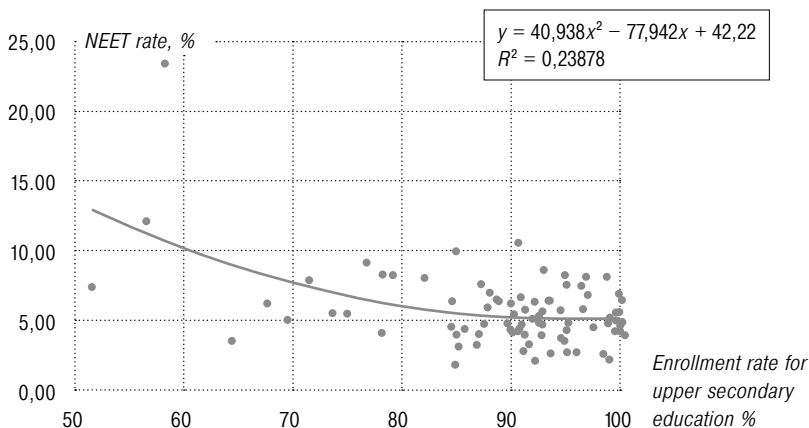
Source: Calculated based on data obtained from Rosstat and the Federal Service for Supervision in Education and Science

$$y = 40{,}938x^2 - 77{,}942x + 42{,}22$$
$$R^2 = 0{,}23878$$

Regional urbanization rate has a significant impact on participation in general upper secondary programmes, but vocational enrollment is barely related to regional demographics. Otherwise speaking, how many low secondary graduates will proceed to general secondary education and how many will become secondary vocational students depends crucially on the level of vocational education system development and education policies in the region.

3.2. Education System Indicators and Success in Afterschool Life
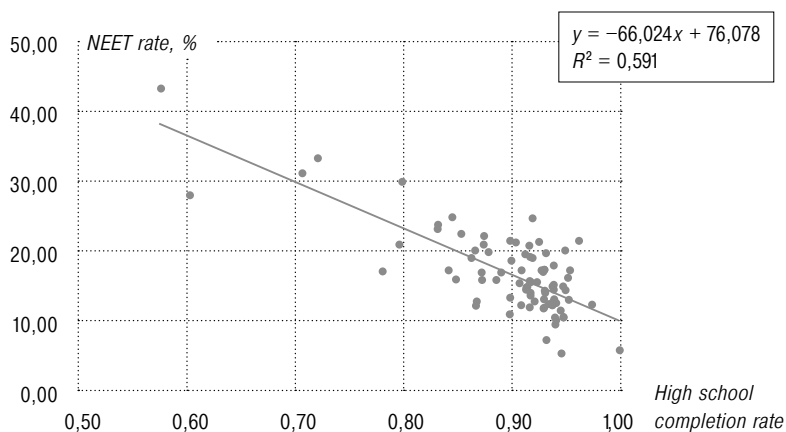3.2.1. Participation in Education

Participation in education is one of the most frequently used characteristics of education systems. It is described using such statistical indicators as enrollment rates (measured by dividing the number of students enrolled in a specific level of education by the size of the population in the relevant age group), entrance and graduation rates (measured by dividing the number of students entered and completed a specific level of education by the size of the population in the relevant age group) and completion rate (measured by dividing the number of graduates in a specific level of education by the number of students enterd the relevant number of years ago).

This study explored participation in upper secondary education and the distribution of students in this level by program type. In compliance with the International Standard Classification of Education [UNESCO Institute for Statistics 2013], upper secondary education includes not only grades 10 and 11 of general upper secondary school but also the first two years of vocational programs based on low secondary education.

Correlation analysis performed for upper secondary school shows that participation in this level of education correlates significantly negatively with the likelihood of becoming NEET after school (Figure 1).

Figure 2. **Correlation between general upper secondary completion rate and success in afterschool life**

NEET rate, %

$y = -66,024x + 76,078$
$R^2 = 0,591$

High school completion rate

Participation in vocational programs has a much greater impact on success in afterschool life than general upper secondary enrollment. This is perfectly consistent with the results of our earlier study designed to assess young people's chances of getting employed depending on their educational attainment [Agranovich 2019a], which show that candidates with the general upper secondary education face the lowest demand in the labor market.

An important indicator of participation in education is the completion rate, which shows the percentage of students completing their programs successfully. The average completion rate for secondary education in Russia exceeds 90%, which is fairly high and above the OECD average (80%) [OECD2019]. At the same time, considerable variation in this parameter across the regions of Russia indicates that some of them have high early school leaving rates. Such regions include the Republic of Ingushetia (0.72%), the Republic of Dagestan (0.71%), the Tyva Republic (0.60%) and the Chechen Republic (0.58%).

Upper secondary completion rate is closely related (correlation coefficient > 0.7) to the NEET rate (Figure 2).

Such a close relationship between the general upper secondary completion rate and the NEET rate denotes that a relatively large proportion of early leavers may be the reason why the regions listed above exhibit NEET rates higher than the national average.

With the exception of Tyva, all the regions with the lowest completion rates were located in the North Caucasus. It could be assumed that gender played a key role here, but this assumption requires further investigation.

Figure 3. **Correlation between the share of private expenditure on education and the NEET rate**
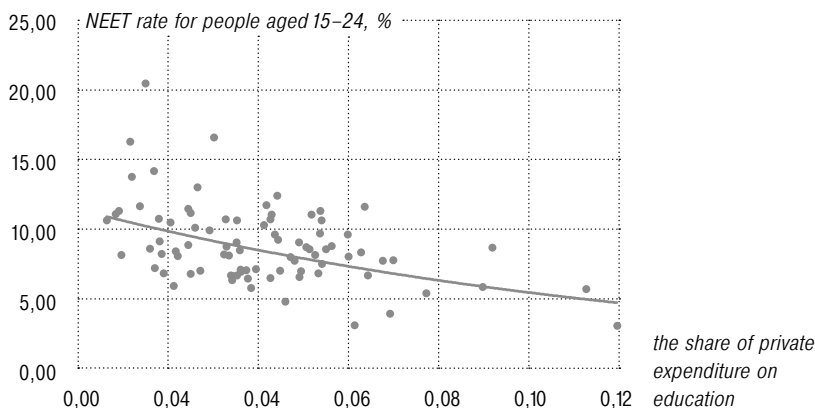
Analysis of correlations between the completion rate and other educational indicators shows that the former is positively influenced by reduced double-shift schooling (the share of students attending school in the morning), some teaching staff characteristics (the share of teachers aged 45–64 and the share of teachers with at least 20 years of teaching experience) and education funding indicators (spending per student).

Therefore, there is a statistically significant relationship between leaving upper secondary education early and success in afterschool life. In addition, the tools have been identified for improving completion rates and, as a consequence, reducing NEET rates.

3.2.2. Education Spending

According to analysis results, education spending per student as a percentage of GRP per capita shows a statistically significant negative correlation with the NEET rate—quite expectedly, as both indicators are contingent on the region's level of economic development.

Another finding appears to be of more importance though. Regression analysis reveals that the share of private expenditure on education correlates significantly with socialization of graduates, higher levels of private expenditure being associated with lower NEET rates (Figure 3).

Although private spending on education consists mainly of household expenditures, which account for 71% of all private sources on average, in some regions major roles are played by extrabudgetary funds (89% in Ingushetia) and private businesses (39% in Buryatia).

Figure 4. **Correlation between the share of morning-shift students in middle school and the NEET rate for people aged 20–24**

3.2.3. Organization of Learning Process

Organization of learning process is reflected in a set of indicators including average class size (average number of students in a class), student–teacher ratio, double-shift schooling and the level of subject specialization at upper secondary level.

Analysis of the impact of class size on socialization, external factors being controlled for, shows little correlation between the average number of students per class in upper secondary school and NEET rates (correlation coefficient $\leqslant 0.3$ in absolute value in both age groups).

Significant efforts have been undertaken to reduce double-shift schooling[10]; ideally, all students should attend school in the morning shift. The share of students attending upper secondary school in the morning approaches or equals 100% in nearly all the regions, varying from 0.94 to 1. This is probably the reason why the share of morning-shift upper secondary students shows little relationship with the percentage of rural population, GRP per capita and NEET rates in both age groups ($\leqslant 0.25$ in absolute value).

Meanwhile, the share of morning-shift at low secondary level students exhibits significant correlations with socioeconomic factors as well as NEET rates. The percentage of middle school students attending school in the morning varies from 62% in the Chechen Republic to 100% in Tula Oblast, Moscow and St. Petersburg (mean = 90%, median = 91%). Negative correlations between this indicator and NEET rates in both age groups are rather strong: r = –0.55, p < 0.001 for

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[10] Passport of national project "Education". Approved by the Presidium of the Presidential Council for Strategic Development and National Projects (Minutes No. 16 of December 24, 2018).

Figure 5. **Correlation between the share upper secondary students in subject-oriented classes and the NEET rate for people aged 20–24**

$$y = 78{,}432x^{0{,}389}$$
$$R^2 = 0{,}1927$$
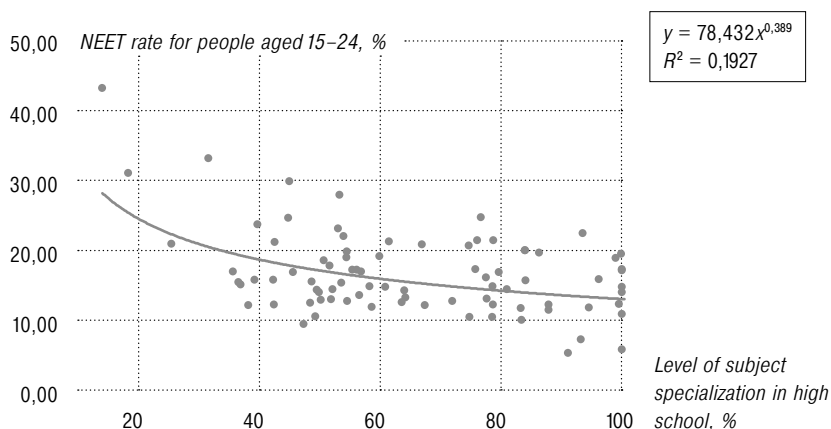
people aged 15–19 and r = −0.63, p < 0.001 for people aged 20–24 (Figure 4).

An important factor of success in afterschool life is the level of subject specialization in at general upper secondary level as a response to students and parents' demand for advanced study of a certain group of subjects. Subject specialization was measured by dividing the number of students in specialized classes and classes with in-depth study of certain subjects by the total number of upper secondary students. As the two categories of students partially overlapped, values greater than 1 were obtained for some regions. In such cases, the indicator value was taken as 1 in further calculations.

Subject specialization at upper secondary level varies a lot across the regions of Russia, from 14% in Chechnya to 100% in Moscow, Chuvashia, Vologda Oblast, Kaliningrad Oblast, Leningrad Oblast, Novgorod Oblast and Omsk Oblast (mean = 66%, median = 61%).

A statistically significant negative correlation was discovered between the level of subject specialization at upper secondary level and NEET rates for both age groups: r = −0.33, p < 0.001 and r = −0.41, p <0.001, respectively. It can therefore be concluded that subject-oriented and advanced learning have positive effects on success in afterschool life (Figure 5).

3.2.4. The Structure of Teaching Staff and Teacher Working Conditions

Learning outcomes of school students naturally depend on teachers, specifically their age, years of teaching experience, educational attainment, workload and salaries.

Based on the results of preliminary analysis, school teachers were split into two groups, those under 40 years of age and those aged 40 and older. Since the shares of these two age groups in the total num-

Figure 6. **Correlation between the share of teachers aged under 40 and the NEET rate for people aged 20–24**

$$y = 0{,}5979x - 1{,}9715$$
$$R^2 = 0{,}3845$$

NEET rate for people aged 15–24, %

Share of teachers aged under 40, %
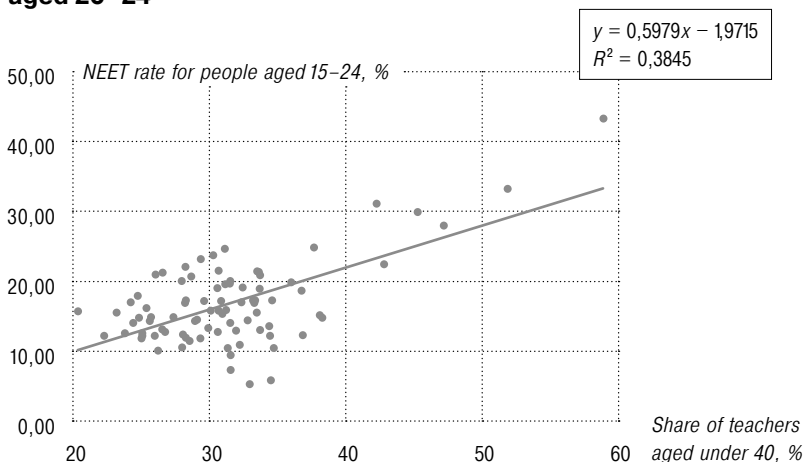
ber of teachers were in inverse ratio, only the age group under 40 was analyzed further.

The share of teachers under the age of 40 varies greatly across the regions of Russia, from 20% in Smolensk Oblast to 59% in the Chechen Republic (the mean and the median being 31%). This indicator shows no pronounced correlation with the percentage of rural population or GRP per capita, but it is related rather strongly to NEET rates for people aged 15–19 ($r = 0.52$, $p < 0.001$) as well as 20–24 ($r = 0.62$, $p < 0.001$). This correlation is positive, i. e. the higher the share of young teachers in a region, the higher its NEET rate (Figure 6). Inversely, higher shares of more experienced teachers correlate with more successful educational and career trajectories of school graduates.

Likewise, teachers were split into two groups as a function of whether they had at least 20 years of teaching experience or not. The share of teachers with less than 20 years of experience varies from 27% in Smolensk to 70% in the Chechen Republic (mean = 40%, median = 41%). Expectedly, this indicator is related to teachers' age ($r = 0.96$, $p < 0.001$), so the same trends as with the previous parameter can be observed here, namely no correlation with the percentage of rural population or GRP per capita and a significant correlation with NEET rates for 15–19- and 20–24-year-olds—positive for less experienced teachers ($r = 0.46$, $p < 0.001$ in the 15–19 age group) and negative for those with at least 20 years of teaching experience ($r = 0.57$, $p < 0.001$ in the 20–24 age group) (Figure 7).

Educational attainment is another characteristic of teaching staff. The share of—teachers with higher education is fairly high in all the

Figure 7. **Correlation between the share of school teachers with less than 20 years of teaching experience and the NEET rate for people aged 20–24**

$$y = 0{,}4792x - 2{,}8942$$
$$R^2 = 0{,}3225$$

NEET rate for people aged 15–24, %

Share of school teachers with less than 20 years of teaching experience, %

Figure 8. **Correlation between the share of college-educated school teachers and the NEET rate for people aged 15–19**

$$y = -0{,}4955x + 51{,}019$$
$$R^2 = 0{,}3927$$

NEET rate for people aged 15–19, %

Share of college-educated school teachers, %
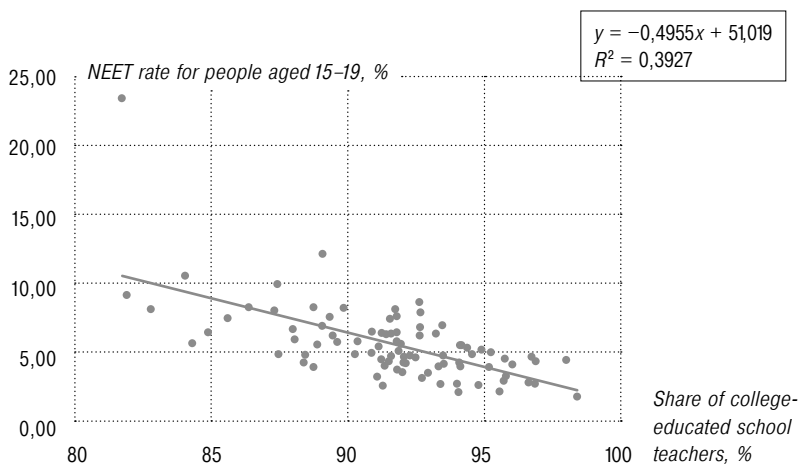
regions, varying from 82% in the Chechen Republic to 98% in Lipetsk Oblast and Moscow (mean = 91%, median = 92%). Socioeconomic parameters of regions (percentage of rural population and GRP per capita) have no impact on variation in this indicator. Meanwhile, a pronounced negative correlation was found between the share of educated teachers with higher education and NEET rates for people aged 15–19 and 20–24: r = −0.63, p < 0.001 and r = −0.52, p < 0.001, respectively (Figure 8).

Therefore, educational attainment of teachers is correlated significantly positively with success in afterschool life. This is the only educational indicator that is related less to the NEET rate for people aged 20–24 than to the NEET rate for 15–19-year-olds.

Student–teacher ratio, an important indicator of teacher workload, was calculated for different levels of education as the average number of students per teacher with relevant educational attainment.

Education statistics do not allow spliting teachers by levels of secondary education, so student–teacher ratio was analyzed for both secondary education levels (Grades 5 to 11) cumulatively. The number of students per teacher in secondary school varies essentially, from 7 in the Republic of Kalmykia to 16 in Tyumen Oblast. It correlates statistically significantly with only one socioeconomic factor, the percentage of rural population ($r = -0.48$, $p < 0.001$), while no correlation is observed with NEET rates, the correlation coefficient being lower than 0.3 in both age groups.

The hypothesis of teacher salaries affecting the learning outcomes was also tested within the framework of this study. Two indicators were analyzed, average teacher salary and relative to regional average teacher salary. Average monthly salaries of school teachers were adjusted for the price of a fixed consumer basket to reduce the effects of cross-regional differences in the cost of living and ensure a more robust comparison. Adjusted monthly teacher salaries vary from the lowest of 21,011 rubles in the Republic of Dagestan to the highest of 72,940 rubles in Yamalo-Nenets Autonomous Okrug (mean = 33,628 rubles; median = 30,323 rubles).

Quite expectedly, average monthly teacher salary was found to be dependent on GRP per capita ($r = 0.56$, $p < 0.001$). In addition, this indicator shows a moderate negative correlation with the percentage of rural population ($r = -0.41$, $p < 0.001$). However, no relationship is observed with NEET rates for people aged 15–19 ($r = -0.11$, $p < 0.001$) or 20–24 ($r = -0.13$, $p < 0.001$).

The results of analyzing the correlations between NEET rates and regional education system indicators are summarized in Table 3, which displays the educational indicators that exhibit the correlation coefficient of at least 0.3 in absolute value at $p < 0.001$.

Unlike the majority of other educational indicators, teacher salary relative to regional average one varies insignificantly across the regions of Russia, from 0.98 in the Mari El Republic to 1.36 in Moscow. Similar to teacher salary in absolute terms, the relative salary indicator shows no correlation with youth NEET rates (correlation coefficient < 0.3).

4. Conclusion   This study focused on two questions: to what extent factors exogenous to the education system influence cross-regional variation in

Table 3. **Correlation between educational indicators and the NEET rates for people aged 15–19 and 20–24**

Educational indicator	NEET rate (Pearson's r)	
	for people aged 15–19	for people aged 20–24
Participation in education (access to education)		
Gross enrollment ratio for secondary education	−0.44	−0.51
Level of subject specialization in general upper secondary	−0.32	0.40
General upper seci=ondary completion rate	−0.65	−0.77
Organization of learning process and conditions of learning		
Share of students attending lower secondary school in the morning	−0.55	−0.63
Resources and funding involved		
Number of computers with access to the Internet	(*)	−0.37
Share of teacher salaries in education spending	0.42	0.47
Education spending per student in rubles, adjusted for BEI	−0.34	−0.46
Education spending per student as a percentage of GRP per capita	(*)	0.46
Share of private expenditures in total spending on education	−0.40	−0.46
Structure of teaching staff and teacher salaries		
Share of teachers with higher education in secondary school	−0.63	−0.52
Share of school teachers aged under 40	0.52	0.62
Share of school teachers with less than 20 years of teaching experience	0.46	0.57

Note: (*)—no statistically significant correlation is observed.

educational indicators, and how this variation is reflected in learning outcomes.

Correlation analysis confirmed the dependence of a number of indicators describing participation in education, funding of education, organization of teaching and learning process, the structure of teaching staff and teacher workload on the external factors of GRP per capita and urbanization rate. This complementary part of analysis was only performed to ensure a higher level of accuracy in calculating the correlations between NEET rates and educational indicators. Yet, some

of the findings obtained at this stage appear to be important and worthy of further research. Such findings include, first of all, the following:

- Educational indicators—except resource-related ones—are related stronger to urbanization rate than to GRP per capita;
- The share of private expenditures in education spending is higher in relatively poor regions than in those that are more economically developed;
- Regional urbanization rate has a significant impact on participation in upper secondary general programmes, but upper secondary vocational enrollment is barely related to regional demographics, i. e. how many low secondaryprogramme graduates will proceed to general upper secondary and how many will become upper secondary vocational students depends crucially on the level of vocational education system development and education policies in the region.

Analysis of correlations between regional educational indicators and the NEET rate, which reflects socialization in afterschool life, revealed the characteristics of education systems that are related significantly to NEET rates and allowed outlining the possible education policies to reduce the share of secondary graduates who are not in education, employment or training. Among the identified factors of NEET rate reduction, the most significant ones include participation in vocational programs at upper secondary level, the level of subject specialization in general upper secondary, education spending indicators, the share of morning-shift students in middle school, double-shift schooling and the share of teachers aged 40 and older.

Of at least no less importance is the finding that there is no statistically significant relationship between NEET rates and some educational indicators playing a key role in Russia's current education policy, such as teacher salaries in absolute and relative terms, student–teacher ratio and some others.

Analysis of correlations between educational indicators and the NEET rate was performed for two age groups, 15–19- and 22–24-year-olds. In most cases, the correlations are more significant for people aged 20–24. A good percentage of 15–19-year-old males, who are not employed or in education, were conscripted for compulsory military service, which probably distorts the picture, reducing calculation accuracy. To avoid this effect, it would make sense using the 20–24 age group for analyzing the NEET rates for secondary school graduates.

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