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How Academic Failures Break Up Friendship Ties: Social Networks and Retakes

[Diliara Valeeva](#), [Sofia Dokuka](#), [Maria Yudkevich](#)

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Abstract. Student academic failures have been traditionally explained by their abilities, socioeconomic status, institutional and social environment. However, the same factors are ignored by researchers when it comes to students at risk of dropping out. Using data about dynamic social networks, we study changes in the status of students with retakes. It was revealed that over time students with low academic achievements become socially isolated that increases their risk of dropping out. The article offers recommendations on surmounting such isolation and contributes to studies of social engagement of students in institutional and social environment.

Keywords: higher education, academic achievement, social networks, academic failure, dropout, social isolation, group dynamics, engagement.

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The Determinants of Expected Returns to Higher Education in Moscow

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Abstract. Based on the data from the cohort longitudinal study "Educational and Career Trajectories", factors affecting absolute and relative expected returns to education (RE) are investigated. Surveys of Moscow students show that academic performance assessed by the Unified State Exam (USE) scores is an important predictor of students' salary expectations. Besides, expected RE also correlates positively with col-

lege selectivity. Students in private colleges expect to be paid lower than those in state universities. Social and cultural capital of the family (parental education, number of books at home) may influence salary expectations indirectly, through academic performance. Students from wealthier families expect to have a higher RE than their disadvantaged peers, and so do boys as compared to girls. Students working part-time expect to be paid higher than non-working students after graduation but anticipate a lower return on investment in relative terms.

Keywords: higher education, selective universities, private colleges, state universities, student expectations, expected return on education, salary expectations, social capital, cultural capital.

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Economic agents make most of their decisions under uncertainty [Delavande, Giné, McKenzie 2011]. However, even when an agent is perfectly rational, the only thing they know for sure is the probability distribution of future period scenarios. This fact dictates the need to investigate how individuals develop their expectations.

Why are expectations that important? Once formed, they influence directly agents' economic incentives associated with consumption, employment, investment decisions, etc. For instance, expectation of a future increase in earnings boosts consumption today, thus promoting output. Inflation expectations and perception of the national unemployment policy are important factors forming the labor supply curve. Expecting an increase in the bond interest rate, investors try to sell their bonds, thus reducing their value. In the foreign exchange market, expectations of change in the national currency market value

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affect the triggers for buying or selling, thus influencing the exchange rate. Therefore, decisions in most diverse markets can be based on expectations and affect, and in turn, the choice of strategies for future periods, thus ensuring the long-term equilibrium.

Expectations in economics represent a relatively new field of research: “Works by classical economists will hardly touch upon the problems of uncertainty or expectations; even when Keynes reflects on the problem of expectations and their importance for the decision-making process, expectations are taken for granted and thus don’t play any significant role in the development of Keynesian macroeconomic theory” [Hashem Pesaran 2002:192]. It was only in the second half of the 20th century that economists turned their attention to formation of expectations and to investigating the factors that consolidate economic agents’ expectations. At that time, the development of this field of study received a boost, giving birth to various theories explaining the expectation phenomenon.

In this paper, we study income expectations of undergraduate students. The study is aimed at assessing the factors that influence the development of salary expectations by having a college degree (absolute expected returns to higher education) and the percent exceedance of expected salary with a college degree over expected salary without a college degree (relative expected returns to higher education).

We focused our research on 2014/15 Moscow high school graduates admitted to colleges that same year. In a sample like this, respondents come from the same region, so they deal with the same price levels, the same average salary, and the same average spending level. In this case, we can assume that they may have homogeneous ideas of economic indicators that are not influenced by regional characteristics (as would be the case in a mixed-region sample). The vast majority of Moscow high school graduates who went on to college did so in Moscow, and only few continued their education in colleges in other regions. Consequently, such students are very likely to work in Moscow after graduation, i. e. we will be dealing with the same Moscow labor market when analyzing expectations of earnings and returns to education.

In view of this, the novelty of this study is determined by the specific sample features: low mobility of applicants (most Moscow high school graduates enter Moscow colleges), homogeneous student perception of the higher education market structure (since it is easier to compare colleges within one city than all over the country) and of the Moscow labor market, i. e. the overall neutrality of regional characteristics in the development of salary expectations. Hence, we can assume and test empirically the effects of college characteristics on the expected returns to higher education. We intend to reveal differences in the expectations of students attending the most and the least selective colleges and demonstrate how those expectations correlate

with college selectivity and the fact that graduates of the top-ranked colleges are, on average, paid higher. The findings are interpreted in terms of the human capital theory, i. e. in terms of the costs and benefits associated with higher education.

The practical relevance of the research is as follows: economic expectations of individuals play an important role in their choices, which is confirmed by studies on different types of markets. Consequently, salary expectations in the higher education market and in the labor market can influence decision making both in selecting an educational trajectory, namely the level (vocational or tertiary) and the quality of education (a specific educational institution), and in developing future employment preferences. Analysis of salary expectation determinants will reveal the role played by characteristics that are not related directly to individual (innate)abilities: family, school education, and the college selected—making it possible to discuss the problem of unequal chances in the labor market as early as at the start of college studies. Research findings can be used both by households (students and their parents) in selecting a college and by the government in elaborating a higher education policy designed to reduce inequality of access to higher education and mitigate its effects in the labor market. In other words, findings will allow the development of targeted support measures for the most disadvantaged students who did not benefit from the college admission process unification. In addition, the study contributes to the theory of human capital and the economic expectations formation theory as applied to the higher education market and the labor market.

The empirical basis of the research is represented by the data obtained in the multi-panel longitudinal study *Educational and Occupational Trajectories* conducted by the Center for Cultural Sociology and Anthropology of Education (Institute of Education, National Research University Higher School of Economics (HSE)) in cooperation with the Public Opinion Foundation¹.

The article is structured as follows: chapter one sums up the key findings of previous research on the role of economic agents' expectations in decision making and the significance of expectations in educational choices. Based on the data on expected and realized returns to education and the factors that affect them, we construct the research framework and formulate hypotheses to be tested empirically. Chapter two provides a data description and assessment of expected returns to education depending on college major. Chapter three presents the results of a correlation analysis of the key variables. Chapter four contains regression analysis results. The final chapter offers conclusions and directions for further research.

¹ For more detail, see <https://trec.hse.ru/>.

1. Expected returns to higher education: previous research findings

The expectations of economic agents represent their subjective evaluations of how various economic parameters will be realized in the future. Expectations about future periods that are formed today are extremely important as they will reflect upon further decision making, since most individual decisions are long-term in nature [Delavande, Giné, McKenzie 2011]. Up until recently, researchers used to be rather skeptical about the viability of empirical analysis of expectations, doubting their predictive power. However, the most recent studies show that respondents understand questions about the future quite well and provide adequate answers to them, while expectations as such are effective in predicting the behavior of economic agents in future periods [Ibid.].

Indeed, expectations of individuals contribute to the development of their behavioral patterns in various economic sectors and various markets. For example, if depositors doubt the solvency of a bank, they are more likely to withdraw their deposits urgently, which can ultimately result in a banking runs [Calomiris, Mason 1997; Jacklin, Bhattacharya 1988]. In the foreign exchange market, investors' expectations about the national currency exchange rate in the future influence the value of foreign stocks and depositary receipts [Eichler 2011], while the value of securities depends on investors' inflation expectations as well as expectations of a company's profitability ratios [Keran 1971]. Subjective inflation expectations of companies also play an important role in market performance [Henzel, Wollmershäuser 2008].

The significance of agents' expectations is not restricted to financial markets. Agricultural [Nerlove, Bessler 2001] and labor market [Sandell, Shapiro 1980] development is also subject to the influence of market participants' expectations. In this regard, special attention must be paid to the income and career expectations of economic agents and the effects they have on decision-making processes and consumption dynamics. Thus, subjective perceptions of labor mobility affect the consumption redistribution patterns: positive career expectations decrease the probability of redistribution, unlike negative ones [Rainer, Siedler 2008]. Income growth expectations are associated with actual income growth, and consumption growth is associated with expected income variations [Jappelli, Pistaferri 2000]. Besides, income expectations are also connected with other major life decisions, such as having a child [McCrate 1992].

As we can see, expectations of future earnings strongly influence the development of individual behavioral (economic) strategies. College students are no exception, being likely to develop expectations regarding their earnings after graduation. Research of behavioral patterns shows that students who expect to work in higher-paying economic sectors tend to consume more than their less ambitious peers at college already [Gustman, Stafford 1972]. This means that student expectations regarding future salaries determine their current consumption rates.

While *actual* returns to education have been investigated in a number of studies and assessed using plenty of empirical assessment methods (for an overview, see [Diagne, Diene 2011]), studies on *expected* returns to education are much less numerous. Meanwhile, salary expectations and expected returns to education are crucial factors in selecting an educational trajectory: expectations contribute to demand for education and affect the choice of both major and college. In other words, according to the human capital theory [Becker 1962, 1964; Schultz 1961; Dickson, Harmon 2011], these expectations contribute to the choice of the level of investment in human capital².

Why study student expectations? First, in terms of educational choice, expectations regarding the costs and benefits of higher education may become barriers of access to such education. Children from less advantaged families (with low levels of income, social and cultural capital) tend to overestimate the *costs* associated with higher education, and such expectations can discourage them from obtaining higher education [Grodsky, Jones 2007]. On the other hand, positive expectations of the *benefits* from (returns to) education promote the demand for educational services [Jensen 2010]. Besides, education decisions are also affected by parental expectations. For instance, individual salary and employment expectations determine the choice of college for boys; girls' individual expectations have no such predictive power, yet their choice is affected a lot by the expectations of their mothers [Attanasio, Kaufmann 2014]. Another study of the same authors revealed a significant correlation between youth expectations and choosing the level of education [Attanasio, Kaufmann 2009].

Second, expectations also influence the choice of college major, which, in turn, affects the supply of graduate labor in relevant occupations in the long run [Arcidiacono, Hotz, Kang 2012; Staniec 2004]. College majors offering greater flows of future earnings tend to be more popular among school leavers than those with the highest starting salaries [Berger 1988].

The focus of our research is on the determinants of expected returns to higher education. Let us review the studies devoted to this issue. A number of works reveal a positive correlation between academic performance as compared to peers, which can be regarded as a "noisy" indicator of individual achievement, and salary expectations [Brunello, Lucifora, Winter-Ebmer 2004; Wolter, Zbinden 2001; 2002] as well as academic performance in high school [Webbink, Hartog 2004]. This fact is consistent with the assumptions of the human capital theory, as better academic performance can indicate a higher level of investment in human capital and should therefore imply higher returns on such investment. A positive correlation is also found be-

² In a number of cases, similar findings are produced by using either expected or actual salaries and relative returns to education [Dominitz 2001].

tween academic performance, getting a scholarship for academic excellence, and subjective assessment of the value of education being obtained [Sequeira, Spinnewijn, Xu 2013].

Parents play an important role in the educational choices of their children, so family characteristics can also be predictors of expected returns to education. Such characteristics include parental education, but empirical data on its relationship with student expectations is ambiguous. Some studies establish a negative influence of the father's education on students' expectations [Brunello, Lucifora, Winter-Ebmer 2004; Smith, Powell 1990], while others reveal a positive relationship between parental education and returns to education [Gamboa, Rodríguez 2014]. There is also data on a positive correlation between the mother's education and the salary expectations of students [Brunello, Lucifora, Winter-Ebmer 2004]. Such discrepancies may result from the fact that students from less advantaged families tend to overestimate the benefits of higher education, while their peers from families with higher levels of social capital make more realistic predictions. In other words, the result may depend on the sample structure and the distribution of students by socioeconomic characteristics.

Income, another critical socioeconomic characteristic of a household, also exerts considerable influence on students' salary expectations [Gamboa, Rodríguez 2014; Botelho, Pinto 2004; Smith, Powell 1990; Webbink, Hartog 2004; Andrushchak, Natkhov 2010]. First, students from higher-income families tend to expect higher earnings themselves. Second, wealthier families can provide greater financial investments in human capital, which should yield better returns.

There is ample empirical evidence of gender differences in the formation of salary expectations. For the most part, girls make less ambitious predictions than boys [McMahon, Wagner 1981; Brunello, Lucifora, Winter-Ebmer 2004; Botelho, Pinto 2004; Anchor et al. 2011; Smith, Powell 1990; Webbink, Hartog 2004]. This can probably be explained by the fact that boys and girls see their post-graduation roles differently, e. g. girls can envisage parenting, not just working.

Income expectations of students also differ depending on the college major they choose [McMahon, Wagner 1981; Betts 1996; Webbink, Hartog 2004; Andrushchak, Natkhov 2010], which reflects actual salary differences depending on the occupation.

The first large-scale study on students' salary expectations in Russia was conducted in 2009 using a survey of high school graduates and their parents from 16 major cities of the Russian Federation [Andrushchak, Natkhov 2010]. The study has a number of limitations that are reflected in this paper. First, GrigoryAndrushchak and TimurNatkhov studied the expectations of school leavers who were going on to college. We have no information on whether they actually made it to college or not, or, if they did, to which one exactly. Second, we have no necessary data on high school exit examinations or

the USE³ scores (if this option was available) of 2008/09 high school graduates. Third, the sample included provincial students from regions differing in levels of socioeconomic development and, as a consequence, in labor market parameters. However, the empirical research did not control salary expectations for the average income level in a region, for instance. Finally, the low rate of response to the question about salaries and the resulting small number of observations suitable for econometric analysis can reduce the explanatory power of the conclusions drawn by Andrushchak and Natkhov.

All of those limitations are dealt with in this study: we analyze first-year students, knowing their USE scores, college and major. All our respondents live in Moscow, so the higher education market and labor market characteristics are identical for all of them (regional socioeconomic characteristics do not vary). The number of observations available for empirical analysis exceeds, by several times, the relevant indicator of the previous study on salary expectations.

Human capital theory [Becker 1962, 1964; Schultz 1961] provides the theoretical framework for this research. We regard students as investors in their own human capital. Students (and their parents) can make both financial and intangible investments. For example, if a student demonstrates excellent academic achievement in high school, scoring well in the USE, we can say that he/she invests in his/her human capital more than his/her lower-performing peers. Positive effects on USE results can also be produced by social capital (e. g. more educated parents will encourage successful development of their child) and cultural capital, i. e. intangible investments in human capital. Apart from that, parents may invest financially in their child's human capital, e. g. by paying for supplementary courses, buying study materials, etc. Wealthier parents have more resources to make financial investments in the student's human capital. The lack of one type of investment can be compensated for by another to some extent, e. g. high-income parents may pay a tuition fee to ensure a place in a selective college for their child in the case when the latter did not score well enough in the USE to qualify for a government-funded place.

It is logical to assume that students who have made considerable investments in their human capital themselves (e. g. by scoring well in the USE and entering a selective college) or received such investments from their parents should expect higher returns on those investments, i. e. returns to higher education. Therefore, a few hypotheses can be put forward.

Hypothesis 1. Students with higher USE scores expect higher returns to higher education in both absolute and relative terms as compared to their lower-scoring peers because the former have made higher intangible investment in their own human capital.

³ the Unified State Exam.

Hypothesis 2. Students from families with high levels of social and cultural capital (parental education and number of books at home) develop higher salary expectations, because these indicators correlate positively with the level of intangible investment in human capital.

Hypothesis 3. Family income correlates positively with salary expectations, being an important source of financial investment in human capital.

In addition, we offer some complementary hypotheses related to gender and learning process characteristics.

Hypothesis 4. Boys have higher salary expectations than girls, being more ambitious in their perception of the labor market.

Hypothesis 5. Students combining work and study expect higher starting salaries than their non-working peers, because their working experience will give them a competitive advantage in the labor market.

Hypothesis 6. Students attending private colleges often have less ambitious salary expectations than students at state colleges. These differences have to do with low selectivity of private colleges and lower quality of education programs they offer.

2. Research data

This paper uses the results of the *Educational and Occupational Trajectories* panel study. Since we are focused on the analysis of the salary expectations of Moscow high school graduates, this study is based on the data of a regional—Moscow—panel. The first wave of the survey was conducted in the 2012/13 academic year, when the students were ninth-graders. This was when the sample structure was realized: students were first of all grouped into geographic strata (depending on the administrative district); next, schools in each administrative district were grouped by type, and schools were randomly selected sampled for the survey (the total sample included 274 schools); further on, all of the ninth-graders in each of the sampled schools filled out the survey questionnaire. The second wave was conducted in the 2014/15 academic year, when the former ninth-graders were either in their final year of high school or attending a vocational school. The third wave was realized in 2015, when the students were admitted to colleges, continued attending vocational schools, or entered the labor market. We only selected the students admitted to colleges and doing their first-year studies at the moment of the survey⁴. Descriptive statistics are presented in Table 1.

⁴ Such a sampling technique was dictated by the research objectives: we analyzed expectations of returns to higher education among people who had

Table 1. **Descriptive statistics**

Variable	Number of observations	Min.	Max.	Mean	Standard deviation
Expected salary (rubles per month)	1,050	20,000	150,000	56,300	23,633.53
Expected returns to higher education	1,050	0	3.71	1.17	0.80
Gender (= 1 if male)	1,050	0	1	0.43	0.49
USE score in Russian	1,050	27	100	77.08	12.21
USE score in mathematics	852	4	100	58.03	18.87
College selectivity (based on USE scores)	1,001	51.8	94.7	73.86	9.69
Mother's education (=1 if higher education)	934	0	1	0.69	0.46
Father's education (= 1 if higher education)	817	0	1	0.63	0.48
Maximum level of parental education (=1 if at least one parent with higher education)	974	0	1	0.77	0.42
Single-parent family (= 1 if yes)	1,038	0	1	0.09	0.29
Number of books at home	1,045	5	650	253.72	216.33
Family income(number of category)	990	1	6	4.14	0.99
Type of school (=1 if secondary general education school)	1,050	0	1	0.65	0.48
Private college (= 1 if yes)	1,035	0	1	0.09	0.28
Full-time student (= 1 if yes)	1,049	0	1	0.95	0.22
Tuition (= 1 if yes)	1,047	0	1	0.50	0.50
Work (= 1 if yes)	1,050	0	1	0.13	0.34
Personal income (rubles per month)	1,050	0	130,000	4,814.69	11,909.21

Note: The number of observations differs for the key variables. Most missing answers are explained by the fact that the sample includes students from both two- and single-parent families. Questions on family's financial status are normally considered to be sensitive, so respondents often answer them less willingly. Besides, the question was presented to students, not their parents, whose income usually forms the basis of material wellbeing, so students could find it difficult to assess the financial status of their families. Moreover, the name of the college and the department were not specified in a number of cases.

The key (dependent) variables involved in the empirical analysis include expected starting salary (rubles per month, in absolute terms) and expected returns to education (in relative terms). These variables were obtained from students' answers to the following questions.

53. What salary (based on today's prices, without adjustment for inflation) do you expect to be paid after graduating from the college you are attending? (*Please give your answer in figures.*)

_____ rubles/month

-1. No answer

54. Suppose that you quit college today and got a full-time job, what salary do you think you could expect to be paid? (*Please give your answer in figures.*)

_____ rubles/month

-1. No answer

Answers to the first questions were used to calculate the indicator of expected starting salary (w^e). The values vary from 20,000 to 150,000 rubles per month among Moscow first-year college students, the mean being 56,300 rubles per month. Such expectations are unreasonably high: according to the 2014 Monitoring of Russian College Graduate Employment⁵, the average starting salary of Moscow graduates was 38,504 rubles per month, with graduates being an average age of 28. The regression analysis will use a logarithm of expected starting salary ($\ln(w^e)$).

Expected (relative) returns to higher education (R^e), the second indicator of salary expectations, were calculated as follows:

$$R^e = \frac{w^e}{w_0^e} - 1,$$

been admitted to colleges with specific characteristics and who developed their expectations depending on college selectivity. What matters to us are not the expectations before admission (as in [Andrushchak, Natkhov 2010], for example) but the expectations after admission, i. e. during the period when first-year college students have already familiarized themselves with characteristics of the selected college, its academic environment, the level of graduates' salaries, etc. This is why we exclude school leavers who did not apply to college (did not seek to obtain higher education) and those who applied but failed (as we need to consider characteristics of specific colleges in formation of expectations). As we can see, sampling bias is justified by the objectives of this study. Besides, while sampling, we did not take into account answers provided by respondents with unrealistic expectations (which is in line with the theoretical framework of research). The upper limit of salary expectations was set to 150,000 rubles per month (inclusive), and relative expected returns to education were under 4.

⁵ <http://graduate.edu.ru/registry#/?year=2014&slice=6&board=1>.

Table 2. **Distribution among major domains of learning**

Major	Number of observations	Proportion (%)
Mathematical and Natural Sciences	95	9.0
Engineering and Technology	247	23.5
Healthcare and Medicine	64	6.1
Social Sciences	219	20.9
Education and Pedagogy	50	4.8
Humanities	56	5.3
Arts and Culture	19	1.8
Economics and Management	299	28.5
No answer	1	0.1
Total	1,050	100.0

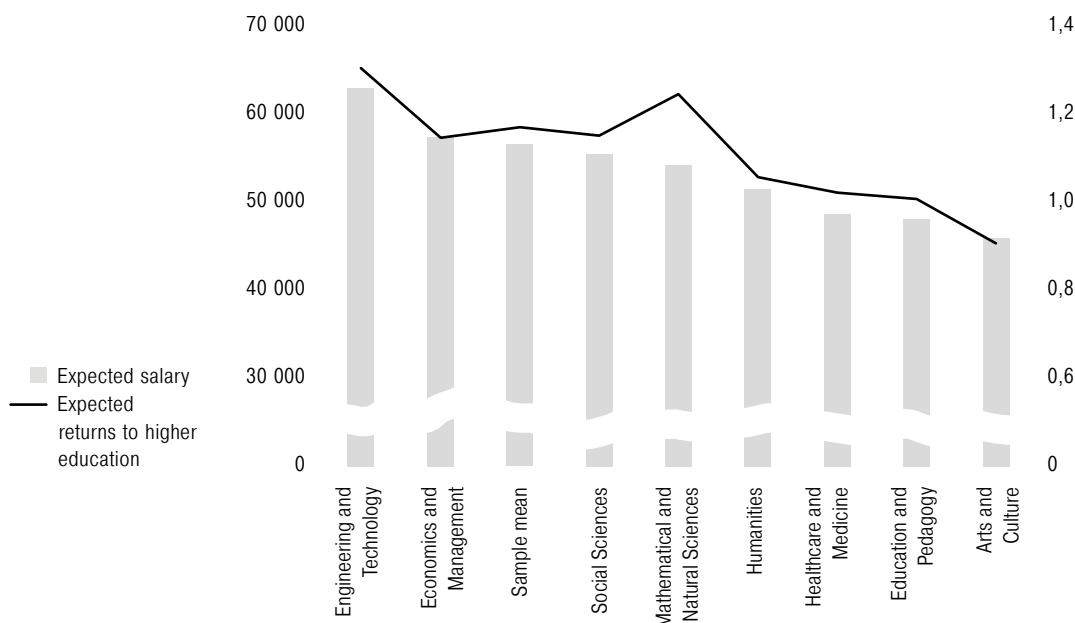
where w_0^e is the salary the student would expect to be paid if he/she quit college today and got a full-time job, i. e. salary expectations in the case of renouncing higher education.

The coefficient of expected returns to higher education shows the excess of income (in relative terms) that will be provided by college education. We excluded some answers with negative returns to higher education from the analysis as being inconsistent with rational choice logic. As a result, this variable takes on values from 0 to 3.71, the mean being 1.17. That is to say, students expect to be paid on average 117% higher (i. e. more than twice as much) after graduation than they would be paid if they quit college. The major difference between absolute returns to education (w^e) and relative returns to education (R^e) is that the relative returns indicator depends much less on time-fixed individual differences (first of all in competencies) and on the variables that affect the numerator and denominator variables (w^e and w_0^e , respectively) unidirectionally (e. g. family characteristics).

The sample includes students in different majors. Table 2 presents the distribution of first-year students among major domains of learning (originally based on the relative list provided by the Ministry of Education and Science, but the Economics and Management category was later separated from the Social Sciences category).

The most popular domains of learning turned out to be Economics and Management; Engineering and Technology; and Social Sciences. Salaries differ for graduates of different departments and majors (e. g. engineers can be paid higher than teachers), so it would be logical to assume that expectations of students in different majors regarding salaries and returns to education will differ too. Figure 1 shows the mean values of the relevant parameters depending on the major selected.

Figure 1. **Mean values of expected starting salaries and expected returns to higher education depending on college major**



Analysis of means with a breakdown by majors shows that the highest salary expectations are typical of students in Engineering and Technology and Economics and Management, while students in Education and Pedagogy and Arts and Culture demonstrate the lowest salary expectations. Expected returns to education are the highest for students in engineering, mathematical and natural sciences (economists, while expecting to be paid well, believe that relative returns to economics education are not that high) and the lowest, again, for those in Pedagogy and Arts and Culture.

On the whole, there is a positive correlation between salary expectations and expected returns to higher education, with the exception of the Mathematical and Natural Sciences domain. The observation can be interpreted as follows. Students in this domain of learning expect their starting salaries to be near average. Nevertheless, they predict the relative value of higher education to be pretty high, believing that they can earn much less without college education. On the one hand, such a relationship between expectations can indicate an underestimation of returns to secondary education; on the other hand, students in mathematical and natural sciences have better competencies in mathematics, physics and chemistry (which manifest themselves in high school already) and realize that higher education is indispensable in ensuring their effective application.

The following variables were selected as potentially correlating with salary expectations and expected returns to higher education, based on the previous research findings and the hypotheses offered herein (Table 1).

Student gender. The proportions of boys and girls in the sample are 43% and 57%, respectively.

The selected *academic performance* indicators include *USE score in Russian* (mean: 77 points) and *USE score in mathematics* (mean: 58 points) as compulsory tests taken by all high school graduates. Besides, *college selectivity* (average USE score among admitted students) is an indirect indicator of student abilities. The mean selectivity value is 74 points. Correlation analysis (see Table 4) proves that USE scores in Russian and mathematics and college selectivity are quite correlated with one another, so only one of these indicators will be used in each specification during the regression analysis to avoid the problem of multicollinearity.

Table 3 specifies the mean USE scores in Russian and mathematics as well as levels of college selectivity for different majors. The findings appear to be paradoxical in one of the subgroups: although students in Engineering and Technology have the highest salary expectations and expect the highest returns to higher education, they demonstrate the lowest USE performance in Russian and attend the least selective colleges. The paradox can be explained by the following: although the USE in Russian is mandatory for all school leavers and college applicants, admission to engineering and technology colleges is normally based on performance in major subjects (e. g. USE scores in mathematics are generally higher than average in such colleges). At the same time, low selectivity of colleges offering education programs in Engineering and Technology has to do with the low demand for engineering majors in a number of colleges: in some cases, the number of applicants is lower than that of government-funded places available. More than that, the competition is often higher in economic and legal departments (minors) of engineering colleges. However, recent years have seen a growing interest in engineering majors as a response to the state's demand [Kovalenko 2016].

Students in humanities perform best in Russian, while the highest USE scores in mathematics are observed among students in mathematical and natural sciences, which appears to be logical. The highest college selectivity is found in the group of medical students, which has to do with the limited offer of places in these colleges.

Family characteristics are represented by *parental education: mother's education* (mothers with higher education account for 69%), *father's education* (63%), and *maximum level of parental education* (77%). The latter is understood as the highest of the education levels of both parents. This variable takes on the value 1 in cases where at least one of the parents has higher education and 0 otherwise. As these indicators are also strongly correlated (Table 4), only one

Table 3. Mean values of the key parameters depending on the major

Collegemajor	Expected salary	Expected returns to higher education	USE score in Russian	USE score in mathematics	College selectivity
Mathematical and natural sciences	54,084.21	1.2406	80.01	65.33	75.26
Engineering and Technology	62,732.79	1.3004	74.95	62.84	70.88
Healthcare and Medicine	48,515.63	1.0186	78.19	57.78	76.95
Social Sciences	55,242.01	1.1475	77.57	50.33	75.54
Education and Pedagogy	47,900.00	1.0037	76.14	51.68	71.84
Humanities	51,303.39	1.0526	80.75	51.58	73.88
Arts and Culture	45,789.47	0.9039	77.95	53.83	76.67
Economics and Management	57,288.85	1.1427	76.78	56.72	74.13
No answer	50,000.00	1.5000	64.00		
Sample mean	56,336.53	1.1667	77.08	58.03	73.86

of them will be used in the regression analysis. In addition, we use such family characteristics as family composition (students from single-parent families account for 9%), number of books at home (mean: 254), and family income (coded as a continuous measure from 1 to 6, the mean being 4) as variables potentially correlating with salary expectations and expected returns to higher education.

School characteristics are represented by the *type of school*: secondary general education school (65%) or school of another type (cadet boarding school, gymnasium (grammar school), boarding school, education center, lyceum, or cadet school).

Learning process characteristics include: state or private college, full- or part-time studies, and government- or tuition-funded place. Nine percent of the respondents attend private colleges; the overwhelming majority is full-time students (95%); and half of the respondents pay tuition fees.

In addition, students were asked questions on combining work and study. According to the data obtained, 13% of students had a job, the average income in the sample being 4,815 rubles per month. The indicators of working status and personal income are strongly correlated, so only one of them will be used in the regression models.

3. Correlation analysis

Analysis of paired correlations among the variables establishes that dependent variables—logarithm of expected salary and expected returns to education—are correlated strongly with one another (correlation coefficient being 0.59 and statistically significant). Logarithm of expected salary correlates positively with USE scores in mathematics,

the level of the father's education, family income, college selectivity, and full-time studies. Besides, salary expectations are higher among boys than among girls. Logarithm of expected salary correlates negatively with attending a private college.

Expected returns to higher education correlate positively with the mother's education, the maximum level of parental education, college selectivity, and full-time education, while showing negative correlations with attending a private college and combining work and study. Boys tend to expect better returns to higher education than girls.

Some groups of independent variables also reveal strong correlations; these include the indicators of parental education, academic performance (level of competencies), working status, and personal income. Correlations are either weak or statistically insignificant for the rest of the variables. Based on the analysis of paired correlations, we can draw a general conclusion that logarithm of expected salary and expected returns to education correlate positively with the level of parental education and negatively with attending a private college. Gender-based correlation is significant, too. In addition, an important role belongs to the positive correlation between family income and salary expectations.

4. Regression analysis

Two basic econometric models are evaluated. In the first one, logarithm of expected salary is the dependent variable regressed on student characteristics (gender, academic performance) as well as characteristics of family, learning process and job (an analogue of a Mincer equation). In the second specification, expected returns to higher education are the dependent variable regressed on the abovementioned characteristics. Due to strong paired correlations among a number of variables describing academic performance, parental education and learning process characteristics, only one variable in each group is used in the models. Table 4 presents the regression analysis results for the first specification (using the logarithm of expected salary).

Models 1–12 were evaluated by applying the method of ordinary least squares (OLS) to the whole sample. The results demonstrate that salary expectations of boys are higher than those of girls. Academic performance (based on USE scores in Russian/mathematics or expressed in college selectivity) also correlates positively with salary expectations. Father's education is a significant factor in expectations formation. The level of father's education was included in relevant models both as an individual independent variable and as an intersection of the father's education and single-parent variables. The sample includes a tangible proportion of students who were raised by single mothers. Using the father's education variable in the regression analysis would reduce the number of observations. To avoid this, we introduce an integral variable, which is a combination of the level of father's education and family composition. This variable takes on

the value 1 in the case of a two-parent family and 0 in all other cases (a single-parent family or a two-parent family with a low level of father's education). As can be seen from Table 4, using an alternative specification model yields similar results.

Students from higher-income families tend to expect higher starting salaries. Students attending private colleges expect to be paid lower than those who attend state colleges. Students with working experience show higher salary expectations than non-working students.

A number of specifications were controlled for college major. The Social Sciences domain of learning was chosen as a base, as average salary expectations in this domain are the closest to the sample mean. Analysis shows that students in engineering and economic majors most often expect to be paid higher than students in Social Sciences, whereas students in Arts and Culture develop lower income expectations. The differences for other majors were found to be insignificant.

The results of models 1–12 are quite logical and consistent with previous research findings. However, the estimators obtained by the OLS method may be biased due to endogeneity problem: for instance, USE scores are not independent values as such but represent a function of various characteristics, similar to a production function in education [Prakhov 2016]. This is why we suggest using an alternative method to estimate regression of expected salary, namely a two-stage least squares regression analysis (2SLS), which implies constructing a regression model of USE score in the relevant subject at the first stage.

We believe that the USE score in Russian correlates positively with the mother's education and the number of books at home, i. e. the social and cultural capital indicators. In addition, boys perform worse in Russian than girls, while scoring on average two points higher in mathematics. Besides, there is a positive correlation between the mother's education and the number of books at home.

The final results of applying 2SLS to the whole sample are presented in models 13–20 (Table A1 in Appendix). The USE score in Russian has a negative sign in this specification because the resulting model uses instruments for USE scores and does not directly control for gender of respondents (girls score better in Russian, as was demonstrated at the first stage). The USE score in mathematics is significant, but the coefficient is approaching zero, which can also be explained by leaving out student gender at the second stage. The level of father's education has significant effects on the expected salary in all the models. Models 13–20 reveal a positive influence of family income on the formation of salary expectations. Students at private colleges demonstrate less ambitious income expectations than those attending state colleges in the models using the USE score in Russian.

Therefore, summing up the findings, we can conclude that salary expectations of college students correlate positively with academic performance (USE scores or college selectivity), parental educa-

Table 4. **Regression analysis results. Dependent variable: logarithm of expected salary** (method of least squares)

Independent variable	1 OLS	2 OLS	3 OLS	4 OLS	5 OLS	6 OLS	7 OLS	8 OLS	9 OLS	10 OLS	11 OLS	12 OLS
Gender	0.092*** (0.030)	0.051 (0.032)	0.128*** (0.027)	0.088*** (0.028)	0.092*** (0.031)	0.071** (0.033)	0.129*** (0.027)	0.108*** (0.030)	0.102*** (0.030)	0.062** (0.031)	0.138*** (0.027)	0.097*** (0.028)
USE score in Russian	0.002* (0.001)	0.002* (0.001)	0.002** (0.001)	0.002** (0.001)								
USE score in mathematics					0.002** (0.001)	0.002* (0.001)	0.003*** (0.001)	0.002*** (0.001)				
College selectivity									0.004** (0.002)	0.005*** (0.002)	0.005*** (0.001)	0.006*** (0.002)
Father's education	0.064** (0.029)	0.068** (0.029)			0.076** (0.032)	0.085*** (0.032)			0.059** (0.030)	0.061** (0.030)		
Father's education x Two-parent family			0.063** (0.026)	0.072*** (0.026)			0.068** (0.028)	0.079*** (0.028)			0.056** (0.026)	0.063** (0.026)
Family income	0.034** (0.015)	0.029** (0.015)	0.024* (0.013)	0.020 (0.013)	0.041** (0.016)	0.035** (0.016)	0.023* (0.014)	0.017 (0.014)	0.032** (0.015)	0.026* (0.015)	0.020 (0.013)	0.015 (0.013)
Private college	-0.139** (0.055)	-0.137** (0.055)	-0.126*** (0.046)	-0.128*** (0.047)	-0.168** (0.068)	-0.182*** (0.068)	-0.147*** (0.056)	-0.161*** (0.056)	-0.119* (0.061)	-0.102* (0.063)	-0.095* (0.053)	-0.079 (0.054)
Work	0.083* (0.043)	0.090** (0.042)	0.065* (0.037)	0.075** (0.037)	0.089* (0.045)	0.101** (0.045)	0.070* (0.040)	0.081** (0.040)	0.087** (0.043)	0.095** (0.043)	0.063* (0.038)	0.076** (0.038)
Mathematical and Natural Sciences		-0.058 (0.054)		-0.059 (0.050)		-0.046 (0.058)		-0.071 (0.054)		-0.060 (0.055)		-0.054 (0.051)
Engineering and Technology		0.095** (0.042)		0.098*** (0.038)		0.084* (0.048)		0.064 (0.043)		0.098** (0.044)		0.106*** (0.039)
Healthcare and Medicine		-0.070 (0.062)		-0.081 (0.057)		-0.018 (0.090)		-0.073 (0.079)		-0.084 (0.062)		-0.093 (0.057)
Education and Pedagogy		-0.096 (0.071)		-0.087 (0.063)		-0.058 (0.081)		-0.071 (0.074)		-0.086 (0.071)		-0.075 (0.063)
Humanities		-0.058 (0.066)		-0.057 (0.062)		-0.050 (0.086)		-0.049 (0.081)		-0.063 (0.067)		-0.069 (0.063)
Arts and Culture		-0.275*** (0.100)		-0.249** (0.097)		-0.122 (0.122)		-0.116 (0.118)		-0.287*** (0.100)		-0.262*** (0.097)
Economics and Management		0.072* (0.039)		0.032 (0.035)		0.095** (0.043)		0.042 (0.039)		0.066* (0.040)		0.035 (0.035)
Constant	10.466*** (0.119)	10.493*** (0.122)	10.492*** (0.104)	10.514*** (0.106)	10.497*** (0.087)	10.511*** (0.091)	10.528*** (0.075)	10.556*** (0.079)	10.337*** (0.134)	10.306*** (0.141)	10.329*** (0.120)	10.281*** (0.126)
R2	0.044	0.078	0.051	0.077	0.067	0.091	0.077	0.077	0.055	0.091	0.063	0.092
Number of observations	766	766	919	919	735	735	881	881	784	784	1,001	1,001

Standard error is specified in brackets. Significance level: *** 1%; ** 5%; * 10%.

tion, family income, and working status (or personal income) but show a negative correlation with attending a private college. Besides, boys tend to be more optimistic in their salary expectations than girls.

Table 5 contains the results of a regression analysis for expected returns to higher education. They correlate positively with individual USE scores: higher-performing students expect to have better monetary returns to college education. Achieving high academic performance, they invest in their human capital more than others and expect a higher return on investment quite logically. Besides, students attending more selective colleges (where learning is normally more challenging, i. e. associated with higher costs) expect better returns to higher education than students at less selective colleges. This is consistent, for example, with salary-based college rankings: graduates from the most selective colleges usually earn more. Quite naturally, they also expect higher (relative) returns to education.

Parental education is insignificant in these specifications, though it does not mean that family has no influence on students' perceptions at all (see below). Family income is only found to be significant in some of the models. The reason for this may be that, while college students from wealthier families expect to be paid higher after graduation (w^e), they also would expect rather high salaries even if they quit college right now (w_0^e), i. e. both the numerator and the denominator expressed in R^e are higher for this category of students. Therefore, the differences in expected returns to education between the rich and the poor may be insignificant. In addition, using the indicator of relative returns to education can neutralize the effects of family.

Students attending private colleges expect lower returns to higher education than those attending state-governed institutions. A possible explanation can be that state colleges mostly offer educational services of better quality.

Working students expect to be paid higher starting salaries in absolute terms but have lower expectations regarding returns to higher education than non-working students. This paradox can be explained as follows. First, working students have more accurate and realistic perceptions of parameter w_0^e as they are already in the labor market. Second, their working experience allows them to hope for higher starting salaries, because they will have a competitive advantage over non-working students. As a result, expectations of returns to higher education turn out to be lower (more realistic) among working college students than their non-working peers.

As for major-based differences in expected relative returns to education, engineering students expect higher returns than students in Social Sciences in a number of models. No other significant differences have been detected, so the models without control for major (23, 27, 31) can be considered as basic.

Table 5. Regression analysis results. Dependent variable: expected returns to higher education

Independent variable	21	22	23	24	25	26	27	28	29	30	31	32
Gender	0.047 (0.062)	-0.018 (0.067)	0.109** (0.054)	0.056 (0.059)	0.008 (0.064)	-0.041 (0.070)	0.088 (0.057)	0.057 (0.062)	0.050 (0.061)	-0.020 (0.066)	0.109** (0.054)	0.054 (0.058)
USE score in Russian	0.004* (0.003)	0.004 (0.003)	0.005** (0.002)	0.004* (0.002)								
USE score in mathematics					0.005*** (0.002)	0.004** (0.002)	0.005*** (0.002)	0.005*** (0.002)				
College selectivity									0.006* (0.003)	0.008** (0.003)	0.007** (0.003)	0.008** (0.003)
Father's education	-0.025 (0.061)	-0.024 (0.061)			-0.080 (0.067)	-0.073 (0.068)			-0.023 (0.062)	-0.023 (0.062)		
Father's education x Two-parent family			0.010 (0.053)	0.014 (0.053)			-0.024 (0.058)	-0.022 (0.058)			-0.002 (0.054)	0.000 (0.054)
Family income	0.050* (0.030)	0.049* (0.030)	0.030 (0.026)	0.029 (0.027)	0.062* (0.034)	0.060* (0.034)	0.032 (0.029)	0.027 (0.030)	0.046 (0.031)	0.043 (0.031)	0.026 (0.027)	0.024 (0.027)
Private college	-0.244** (0.113)	-0.220* (0.115)	-0.193** (0.094)	-0.184* (0.096)	-0.270* (0.144)	-0.262* (0.146)	-0.197* (0.116)	-0.204 (0.118)	-0.200 (0.127)	-0.137 (0.131)	-0.137 (0.107)	-0.104 (0.111)
Work	-0.162* (0.088)	-0.155 (0.089)	-0.161** (0.076)	-0.152** (0.077)	-0.131 (0.096)	-0.123 (0.097)	-0.117 (0.083)	-0.114 (0.084)	-0.153* (0.089)	-0.144 (0.089)	-0.160** (0.078)	-0.150* (0.078)
Mathematical and Natural Sciences		0.042 (0.113)		0.022 (0.104)		0.076 (0.123)		0.004 (0.113)		0.056 (0.114)		0.036 (0.105)
Engineering and Technology		0.168* (0.089)		0.091 (0.078)		0.140 (0.101)		0.012 (0.089)		0.201** (0.093)		0.114 (0.082)
Healthcare and Medicine		-0.079 (0.129)		-0.097 (0.117)		-0.125 (0.192)		-0.220 (0.166)		-0.090 (0.130)		-0.114 (0.118)
Education and Pedagogy		-0.079 (0.148)		-0.124 (0.130)		-0.027 (0.172)		-0.151 (0.155)		-0.056 (0.149)		-0.111 (0.131)
Humanities		-0.073 (0.138)		-0.160 (0.127)		-0.102 (0.183)		-0.158 (0.168)		-0.081 (0.140)		-0.146 (0.130)
Arts and Culture		-0.285 (0.209)		-0.261 (0.201)		-0.189 (0.260)		-0.189 (0.246)		-0.297 (0.209)		-0.283 (0.201)
Economics and Management		0.061 (0.081)		-0.013 (0.071)		0.068 (0.091)		-0.040 (0.080)		0.067 (0.083)		-0.009 (0.073)
Constant	0.662*** (0.246)	0.669*** (0.255)	0.678*** (0.212)	0.717*** (0.219)	0.720*** (0.182)	0.735*** (0.193)	0.740*** (0.155)	0.819*** (0.165)	0.552 (0.277)	0.415 (0.295)	0.514** (0.245)	0.463* (0.260)
R2	0.023	0.034	0.022	0.030	0.033	0.040	0.032	0.037	0.023	0.037	0.024	0.033
Number of observations	766	766	919	919	735	735	881	881	784	784	1,001	1,001

Standard error is specified in brackets. Significance level: *** 1%; ** 5%; * 10%.

5. Conclusions The study offers empirical estimations of the factors affecting the formation of starting salary expectations of college students. The following results have been obtained from a survey of Moscow high school graduates admitted to college.

Salary expectations of boys are higher than those of girls. Academic performance determined based on USE scores in Russian and mathematics also correlates positively with salary expectations in both absolute and relative terms. Besides, student expectations are positively affected by college selectivity. It is logical to assume that high performers and students attending selective colleges (who can normally boast high USE scores) invest more heavily in their human capital to achieve their learning goals and thus expect a higher return on such investment.

The size of expected salary correlates positively with the economic status of a family, including its social (parental education) and cultural (number of books at home) capital, with such correlations sometimes being indirect, i. e. expressed through individual USE performance. This relationship has been proved by the regression models whose estimated coefficients are obtained using the method of least squares and 2SLS estimators with instrumental variables.

Students attending private colleges demonstrate less ambitious salary expectations than their peers admitted to state colleges. Likewise, they expect lower returns to higher education, which proves indirectly that private college education typically has a lower value in the labor market and private college graduates are normally paid lower.

Students combining work and study expect higher starting salaries than their non-working peers. Work experience will be a competitive advantage for such individuals when they enter the labor market. At the same time, working students develop more realistic expectations of returns to higher education because they can specify their current income more accurately.

The values of expected salary and expected returns to higher education differ across majors. Engineering and technology students show the most ambitious income expectations in both absolute and relative terms, while the lowest starting salaries are expected by students in arts and culture.

Therefore, the theory of human capital has been empirically proved in the context of how expectations of returns to higher education are formed, since a positive relationship has been revealed between investments (both financial and intangible) in higher education and expected returns to higher education.

The conclusions we make in this study are consistent with previous research findings. It is worth emphasizing the importance of the obtained results for the higher education market and labor market in Moscow, as the sample was geographically homogeneous. The differences in expectations depending on academic performance, family and learning process characteristics can affect student strategies

in the labor market. High achievers expect higher starting salaries (return on investment in their own human capital), which is in line with the assumption of the human capital theory. Students attending selective colleges demonstrate higher expectations regarding returns to higher education, while those at private colleges make less ambitious predictions, which proves the important role of higher education quality when assessing returns in the labor market.

Considering that USE scores (and, consequently, the chances for admission to a selective college) are influenced not only by student competencies but also by family characteristics, we can conclude that family is an essential factor affecting admission to college and the development of salary expectations. Students from different families may have unequal opportunities in the higher education market as well as later in the labor market even if they have similar USE scores. Hence, inequality exists even within a single (Moscow) higher education market (i. e. in the absence of costs associated with moving to another city for college), and it can affect accessibility of labor market opportunities in the future.

Our findings confirm the need for elaboration of additional support policies for students from disadvantaged families at both school and college levels. These can include information support (raising awareness of the opportunities offered by the USE), supplementary school-based classes for senior high school students, and financial mechanisms to reduce inequality. Since a strong family influence on salary expectations is preserved even in a unified admission system, the absence of additional inequality reduction policies is fraught with a gap between educational trajectories, which will lead to salary inequalities in the labor market. Ultimately, obtaining higher education will only widen the gap between students from families with different socioeconomic statuses, instead of smoothing it.

As this paper uses the results of a panel study, it appears productive to focus further research efforts on analyzing the extent to which salary expectations of college students are realized and identifying the factors that affect under- and overestimation of returns to higher education.

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Appendix Table A1. **Regression analysis results. Dependent variable: logarithm of expected salary** (method of instrumental variables)

Independent variable	13	14	15	16	17	18	19	20
USE score in Russian	-0.008* (0.004)	-0.003* (0.004)	-0.012*** (0.004)	-0.007** (0.004)				
USE score in mathematics					-0.000** (0.000)	-0.000 (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Father's education	0.099*** (0.033)	0.083*** (0.032)			0.064* (0.036)	0.062 (0.040)		
Father's education x Two-parent family			0.113*** (0.031)	0.101*** (0.029)			0.077** (0.036)	0.072* (0.040)
Family income	0.000*** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)
Private college	-0.175*** (0.063)	-0.142** (0.064)	-0.228*** (0.060)	-0.197*** (0.059)	0.006 (0.091)	-0.009 (0.119)	0.047 (0.098)	0.059 (0.152)
Personal income	0.000* (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Mathematical and Natural Sciences		-0.071 (0.055)		-0.055 (0.054)		-0.253* (0.156)		-0.353* (0.190)
Engineering and Technology		0.092** (0.043)		0.087** (0.041)		-0.102 (0.169)		-0.218 (0.206)
Healthcare and Medicine		-0.078 (0.065)		-0.090 (0.063)		0.064 (0.130)		0.100 (0.144)
Education and Pedagogy		-0.142* (0.073)		-0.137** (0.068)		-0.174* (0.097)		-0.221* (0.120)
Humanities		-0.053 (0.069)		-0.032 (0.066)		0.009 (0.104)		0.079 (0.124)
Arts and Culture		-0.250** (0.100)		-0.230** (0.101)		-0.216 (0.136)		-0.203 (0.158)
Economics and Management		0.071* (0.038)		0.028 (0.037)		-0.160 (0.190)		-0.323 (0.220)
Constant	11.456*** (0.340)	11.050*** (0.340)	11.777*** (0.311)	11.420*** (0.308)	10.922*** (0.056)	11.043*** (0.197)	10.959*** (0.056)	11.174*** (0.229)
Number of observations	766	766	919	919	735	735	881	881

Standard error is specified in brackets. Significance level: *** 1%; ** 5%; * 10%.

A Regional Socio-Geographic Atlas of Secondary Education: Can the “Power of the Territory” Be Surmounted?

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Abstract. A socio-geographic atlas of secondary education in Kaliningrad Oblast has been made after testing new instruments designed for measuring educational inequality at regional and local levels, its reasons and consequences, and the factors affecting its manifestation. The data for the atlas was obtained from open databases on education quality, information on the region’s attractiveness as a location for real estate investments provided by real estate agents, and the results of measuring

the distance of schools from the hubs of social wellbeing. The main assumption at the base of the study is that the influence of environment (factors external to school) on education quality dominates the importance of internal processes. A comparative analysis of the resulting maps of education and territory quality has revealed not only individual resilient schools and schools that require support but also the low quality zones and socio-geographic anomalies of academic resilience. The article offers methods for studying and overcoming the “curse of the territory” and educational inequality at regional and local levels.

Keywords: education quality, assessment in education, contextualization, educational inequality, resilient schools, academic resilience anomalies.

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1. The Need to Contextualize Educational Outcomes

The problem of contextualizing the outcomes of school education remains pressing for the Russian education system and only grows more acute with the mass distribution of rankings based on USE¹ and Olympiad scores, which rather indicate the inequality of opportunities than measure the quality of schooling.

Unequal distribution of human and infrastructure resources among schools contradicts the provision of the Constitution of the Russian Federation (Article 43) that provides for an equal right to education and guarantees accessibility of such education. Unequal access to

¹ Unified State Exam

education has historically been explained by differences in the level of development of educational institutions, being aggravated by differences in the remoteness from large research and cultural centers and different socioeconomic conditions. Not only does a school in a regional center have more opportunities to engage with universities, museums and supplementary education centers while implementing its education programs, but it also normally enjoys greater financial resources to support its activities due to a more favorable economic environment (as compared to remote municipalities) and a higher social status of students' families.

The influence of complex social contexts on school development should be overcome to smooth out the gap in education quality. However, the process is held back by the lack of effective practices and mechanisms of such overcoming that would be suitable for use under various conditions.

The design of methods to overcome educational inequality requires analytical support and research to consider contextual territorial factors in assessing education quality. Such analysis and assessment instruments are only just beginning to develop in the expert community.

The working hypothesis of this study is that education quality cannot be higher than the quality of the territory where the school is located.

The study makes some essential assumptions:

- living in a territory of a specific degree of attractiveness for settlement determines the socioeconomic status of students' families;
- the regional school ranking generally reflects the differences in the quality of secondary education in Kaliningrad Oblast;
- the distance from educational resources and other socially significant goods exerts a decisive influence on the level of their accessibility.

2. Educational Inequality Factors

Education has always been assigned the paramount role in creating conditions for achieving the ideal of equality for all members of society. Meanwhile, equal access to quality education is regarded as an inherent value on the one hand, while on the other hand obtaining an education determines the success of further integration into society, thereby affecting access to other public goods. A clear correlation between family characteristics and the quality of school education has been revealed [Konstantinovsky 2010]. The key factors of inequality in access to education include occupation, job position and the education of parents. While comparing the strongest and the weakest school clusters based on whether students' parents had a higher education diploma or not, the elite cluster outstripped the weakest one by more than 2.5 times [ibid.].

The dominant influence of family and the insignificant role of school as such in shaping the quality of education were demonstrated as early as half a century ago in the so-called Coleman Report [Coleman et al. 1966]. Drawing on the large-scale studies ordered by the US Congress, which involved 650,000 students from 3,000 American schools, the authors showed that it was not per pupil spending, or the size of the school library, or any other characteristic of the educational process, but rather socioeconomic status that was the key factor of educational outcomes. Another factor—less significant, in James Coleman’s opinion—influencing academic achievements of individual students consisted in the intellectual level and social background of their peers [Ibid.]. Some politicians and mass media have constricted Coleman’s findings down to the school-does-not-matter formula. However, in his later works, Coleman focused on identifying the right tools and prerequisites for increasing the role of school in educational outcomes [Coleman, Hoffer, Kilgore 1982].

The data published in the Coleman Report disproved the then prevalent conception of Lyndon B. Johnson, who believed that increasing federal spending on education could solve social problems. The report became a sort of bifurcation point in educational policy; it has been widely discussed far outside the United States ever since. Coleman’s research was followed by a series of studies, both confirming and disproving his findings. Based on those results, the decision was made to double-check the data obtained by Coleman and his co-authors. A team of sociologists from Harvard University reviewed the source data and findings over a one year period and revealed a coding error that affected the interpretation of results significantly. The Coleman Report was strongly criticized by sociologists Glenn Cain and Harold Watts [Cain, Watts 1970]. They discovered essential methodological flaws and statistical miscalculations which undermined the authors’ conclusions.

As a result of reconsidering the role of school in the education system and rejecting Coleman’s fundamental point about the insignificance of formal education in children’s intellectual development, the movement of *effective schools* was born to prove in theory and practice that social barriers could be overcome through elaborate organization of the learning process.

There are other factors of educational inequality, aside from family and school characteristics. In particular, gender plays a key role in creating unequal access to quality education in some Asian and African countries [Buchmann, Hannum 2001].

European authorities speculate widely on the challenge of leveling the educational outcomes of indigenous people and immigrants. In particular, Italy has been faced with the relatively new phenomena of growing refugee flows to Northern Europe (about 250,000 yearly), on top of its regular immigrants (who already account for over 8% of the country’s population) [Bianchi 2016]. Children of immigrants fall be-

hind native students by one or two years, and subsequently they lose out when competing in the labor market where higher qualifications are required. Attempts are currently being made to join the efforts of local authorities and European migration control centers in order to integrate immigrants into the common labor market, ensure their social integration and enhance their linguistic competence. These attempts are encumbered by a considerable diversification in the flows of migrants and refugees, many of whom want to stay in the country. Previously, immigrants to Italy most often came from Eastern Europe, but now they are predominantly represented by refugees from the Middle East and North Africa. In fact, as Patrizio Bianchi underlines, local authorities and European migration control centers need to develop a migration culture in a country that showed a negative net migration rate before 1980 [Ibid.].

Ethnicity is the strongest factor of educational inequality in US schools: despite the substantial efforts made so far, there is still a broad gap between the academic achievements of different ethnic groups [Ladson-Billings 2006].

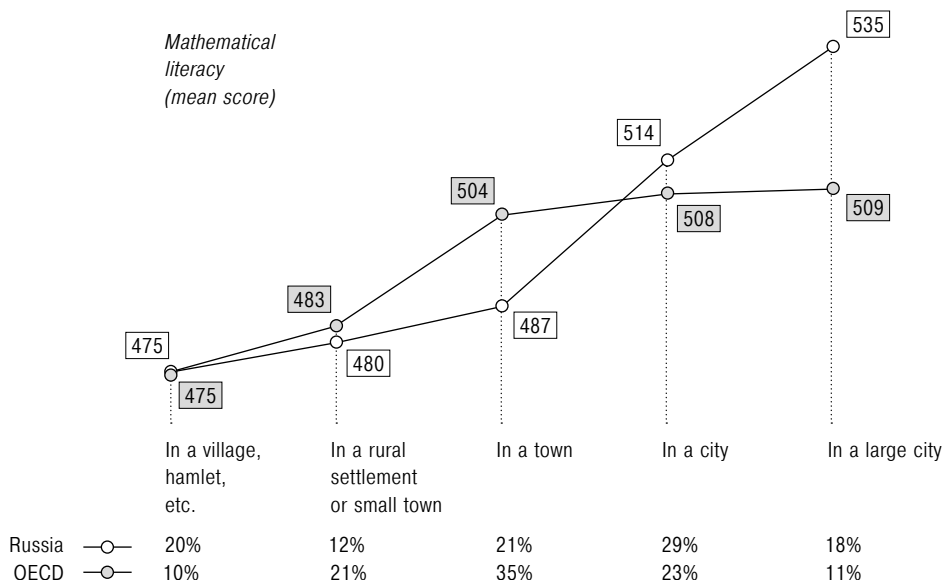
Russian researchers identify three main factors that determine educational inequality: socioeconomic status; school differentiation; and territory [Yastrebov, Pinskaya, Kosaretsky 2014]. The latter, in our view, is the determining and integral factor, as it affects geographical distribution of families with different social status as well as spatial differentiation of resources available for schools.

Sometimes the quality and quantity of supplementary education and leisure activity offered may vary significantly even from one city district to another. However, the latest research shows that such differences have no considerable effect on students' chances of attending supplementary courses in a megalopolis [Sivak, Polivanova, Kozmina 2016]. For this reason, in this study we only consider schools located outside Kaliningrad, as the territorial factor is most likely to grow stronger outside a large city. It may be that the remoteness of educational resources affects their accessibility so little in a megalopolis because of the developed transport infrastructure: results will be quite different in remote rural areas, where no family efforts can help a child overcome the isolation from the main educational centers.

The decisive influence of the socio-geographic context on academic achievement has also been revealed in international studies. According to the Programme for International Student Assessment (PISA), mathematical literacy of school students correlates positively with the population size (Fig. 1). This correlation manifests itself stronger in Russia, while the relevant differences in OECD countries are nearly twice as small [Kovaleva]. International researchers also reveal a relationship between academic performance and socioeconomic status [Ibid.]. The progressive urbanization in Russia aggravates the inequality of geographical distribution of high-income families.

Most often, regional and municipal centers compare favorably to

Figure 1. **PISA-2012 results (mathematical literacy) depending on the population size** [Kovaleva]



the rest of the regional or municipal territory due to the abundance and diversity of educational opportunities they offer: museums, universities, supplementary education centers, and innovative manufacturing companies are concentrated in these large cities. The farther from the centers of relative abundance of resources, the lower the accessibility of good communal, social and other infrastructure. As families seek to provide themselves and their children with maximum comfort and opportunities, the social composition of territories is gradually changing, giving birth to the socio-geographic context, an integral characteristic of a territory describing the degree of isolation from socially significant goods and resources and the social status of families in the territory.

Geographical determinism, which predicts the low performance of schools dealing with a challenging student population in a complicated social context, is not absolute. The studies conducted by the Institute for Education Development (National Research University Higher School of Economics) in three regions revealed that there were schools that worked in difficult social contexts yet provided a pretty high performance level comparable to that of more advantaged schools [Pinskaya, Kosaretsky, Frumin 2011]. The authors believe that the development programs implemented by such schools may be translated to schools working under similar conditions and who are willing to invest a lot of effort, provided that the founder will support them with all the necessary resources.

Along with the empirically proven significance of the socio-geographic context for school performance, there is also a reliably established effect of education quality on territory attractiveness. For instance, housing prices are 2.9% higher within a 600m radius of schools that show high USE results [Chugunov 2015].

Therefore, academic achievement is significantly affected by the socioeconomic status and educational opportunities of the neighboring territory. Meanwhile, a specific organization of the learning process can allow schools not only to overcome the pressure of the environment but also to increase the attractiveness of the neighborhood. Searching for new education management models that will enhance school resilience to the socioeconomic pressure of external and internal contexts is an important area of research in education.

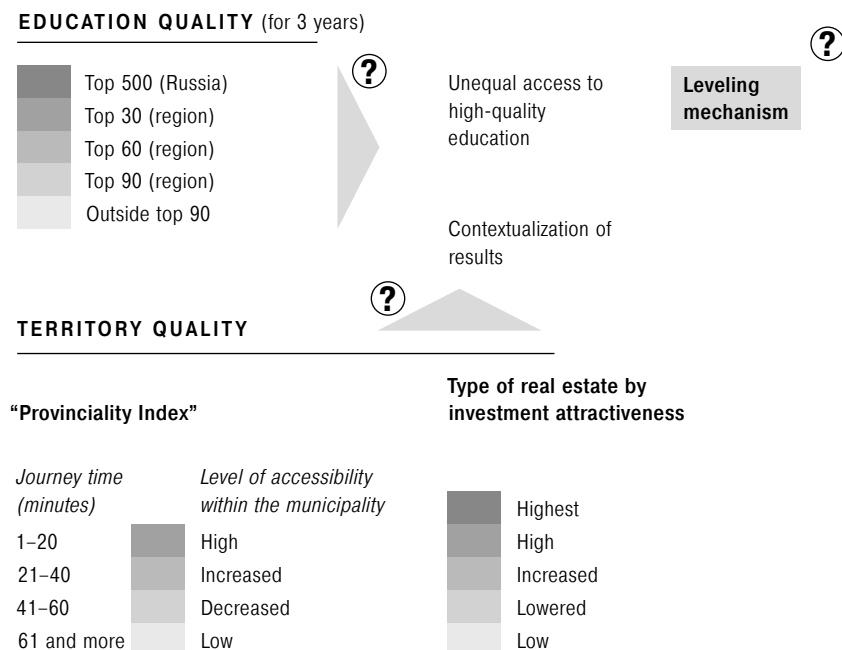
3. Approaches to Studying Unequal Conditions

The international practice of considering specific social context indicators while assessing educational outcomes cannot be always transplanted into Russian reality to assess municipal and regional education systems. For example, using such indicators as ethnic composition or the proportion of immigrants would hardly be effective in Kaliningrad Oblast. This is why a number of researchers [Pinskaya, Kosaretsky, Frumin 2011; Yastrebov, Pinskaya, Kosaretsky 2014], while underlining the need to contextualize school performance indicators to acquire an adequate picture, offer an approach of their own, relevant to the Russian education system.

The proposed contextualization method is built around the idea of empirically identifying the consistent correlations between academic achievements and context indicators (e. g. different characteristics of social composition of the student population) based on multiple regression analysis. The authors suggest using the results obtained to “discount” educational outcomes, i. e. to apply justified higher expectations to institutions working in favorable contexts and lower expectations to those operating under challenging conditions. The Index of School Social Wellbeing [Yastrebov, Pinskaya, Kosaretsky 2014] allows for comparing the performance of educational institutions with due regard to their social contexts and dividing schools conventionally into ‘resilient’ and ‘failing’ categories. Information required for such contextualization is mainly contained in schools’ “social passports” and includes socioeconomic characteristics of students’ families (the proportion of children from single-parent families, from families where both parents have higher education diplomas, etc.).

Drawing on modern methodology [Asaul, Karasev 2001; Demin 1999; Fullan 2011], our study suggests enhancing this approach by investigating the external school context that affects both the accessibility of educational resources and the composition of the student population.

The analysis of educational inequality factors implies evaluating

Figure 2. **Study design scheme**

the territory's attractiveness for settlement based on an expert survey of three independent real estate agents with many years' experience of selling homes in Kaliningrad Oblast, as well as assessing the accessibility of socioeconomic wellbeing resources that are normally concentrated in regional and municipal centers.

The transport accessibility indicator makes it possible to consider a number of external factors, both determining the dispersion of families with different levels of social wellbeing (the level of communal infrastructure development, accessibility of socially significant and administrative facilities, and availability and quality of job vacancies) and influencing the educational process directly (transport and organizational costs associated with obtaining out-of-school educational services, and availability of human resources in a large city).

4. Material and Method

4.1. Education quality assessment methods

The study design is schematically represented in Figure 2.

Education quality was assessed based on the data obtained from open sources:

- the official website of RIA Novosti, which publishes the ranking of the top 500 Russian schools compiled by the Moscow Center for Continuous Mathematical Education. The ranking is based on two

fundamental indicators: (i) performance in Olympiads at regional level and higher, and (ii) USE (2013–2014) and BSE² (2015) scores. Besides this, experts also took into account the non-selective admission principle (which increased the total points by 20%);

- the website of the Ministry of Education of Kaliningrad Oblast that uses the national ranking results to determine the top 30 schools at each education level.

While determining the position of schools by the quality of education offered, this study considered:

- being ranked among the top 500 Russian schools;
- being ranked among the top 30 regional schools;
- the school's regional ranking position.

We analyzed all the abovementioned indicators for the previous three years (2013–2015), calculating the mean value of school ranking to smooth possible random fluctuations.

Based on the national and regional rankings, the municipality schools were divided into five ranks depending on the education quality they offer:

- top (ranked among the top 500 Russian schools);
- high (ranked among the top 30 regional schools);
- increased (31st to 60th positions in the regional school ranking);
- decreased (61st to 90th positions in the regional school ranking);
- low (91st position and lower in the regional school ranking).

Thus, we developed a five-stage school performance assessment scale, which in fact has only four stages when it comes to regional schools outside Kaliningrad, as only one of those schools (Guryevsk Gymnasium) has once been ranked among the top 500 Russian schools for the whole ranking period.

4.2. Educational inequality factor assessment methods

4.2.1. Territory attractiveness for settlement

An expert survey of three independent real estate agents with many years' experience of selling homes in Kaliningrad Oblast was used to evaluate the attractiveness of the region's municipal centers for settlement. The experts were asked to distribute the region's cities and towns among five categories depending on their investment attractiveness: top, high, increased, decreased, and low.

The data obtained was used to calculate the mean value, which was then rounded to the nearest whole number to assign a relevant territory quality rank to each municipal center.

² Basic State Exam

4.2.2. Accessibility of the centers of relative socioeconomic wellbeing

The expert assessment method did not work when it came to defining the territory quality of remote settlements, as the real estate agents reported extremely rare sales, if any, in many of them for the last ten years. In this case, the territory status was assessed by measuring the remoteness of schools from the nearest center of relative social wellbeing defined by the experts—not the actual distance but transport accessibility of the regional and municipal centers with their social and educational resources. To take into account the quality of roads and permissible speed limits, we used not the actual distance in kilometers in our calculations but rather the journey time in minutes, as predicted by Yandex Navigator³ with the “traffic mode” disabled. The municipal centers appeared to be the only centers of relative socioeconomic wellbeing in their municipalities in all cases, except one. As for Guryevsk Urban District located around Kaliningrad, the journey time to the centers of Kaliningrad and Guryevsk was summed up and divided in two. At this stage of method validation, it seemed to be impossible to determine the differences in influence on school performance between these two centers of socioeconomic wellbeing. Therefore, common accessibility of resources in both administrative centers was defined by summing up the estimated journey time without applying correction coefficients or calculating the mean value.

Next, we determined accessibility zones in increments of 10 minutes of a bus ride at the maximum permissible speed of 60 km/h (10-minute, 20-minute, and 30-minute journey time). The increment was established empirically by comparing real estate experts’ assessments to transport accessibility indicators. The speed limit (stipulated by the school bus transportation rules) was only applied when the speed recommended by maps.yandex.ru was higher. Most often, road surface quality worked as a natural speed limiter.

This scale is applicable to municipalities with the top rank of territory quality. In all other cases, a ten-minute increase in accessibility by bus reduced the territory quality by one rank. When the experts assigned the lowest rank to a municipal center, transport accessibility within the municipality was not assessed and the whole municipal territory was assigned the lowest territory quality rank.

The distance of 30 km was defined as the limit of positive effects that a center could have on relative social wellbeing. The school bus transportation rules⁴ require that journey times do not exceed 30 minutes one way. Given the speed limit of 60 km/h, the maximum permissible distance for regular school bus routes is 30 km (the value is normally lower under real road conditions, especially in rural areas).

³ <https://maps.yandex.ru>

⁴ Sanitary and Epidemiological Requirements to Conditions and Organization of the Learning Process in Secondary Education Institutions. <https://rg.ru/2011/03/16/sanpin-dok.html>

Table 1. Correlations between the journey time and the accessibility of the centers of relative socioeconomic wellbeing

<i>Journey time (minutes)</i>	<i>Level of accessibility within the municipality</i>
1–20	High
21–40	Increased
41–60	Decreased
61 and more	Low

Regular transportation of school students at greater distances is prohibited by the sanitary regulations and standards (SanPiN), hence the resources located beyond cannot be considered for the implementation of education programs. Only expensive one-off school trips are possible, yet their influence on education quality is much weaker.

The walking distance indicator of 2 km was used to assess the accessibility of specific cultural and sports facilities attended by school students on their own. The specified value is stipulated by par. 2.5. of SanPiN⁵ in relation to junior school students for the climate zone which Kaliningrad Oblast is part of.

4.3. Geographic distribution of territories of different quality and schools of different performance

Once ranked by the quality of education they offer, all regional schools were plotted on the map of Kaliningrad Oblast (using www.yandex.ru/maps/ as a basis). Next, we analyzed the mutual position of low-performing schools and identified zones of relatively low education quality.

The overall regional map of territory quality was built after generating individual maps showing the accessibility of the center of relative social wellbeing for each municipality.

Statistical processing of data was performed using IBM SPSS Statistics software. Graphs were drawn in MS Excel. Spearman's rank correlation coefficient was used and correlation graphs were constructed to identify the correlations between school ranking and territory quality as well as between education quality and territory quality. To identify the proportion of resilient schools and degrees of resilience, we constructed a frequency distribution graph of education quality and territory quality, which shows how many schools perform according to the resource potential of their territories, how many schools need support, and how many have achieved a level of education quality beyond available resource opportunities.

⁵ Sanitary and Epidemiological Requirements to Conditions and Organization of the Learning Process in Secondary Education Institutions. <https://rg.ru/2011/03/16/sanpin-dok.html>

As we overlapped the education quality and territory quality distribution maps, we discovered schools with corresponding territory and education quality ranks, resilient schools, and schools with an underwhelming status, i. e. those that need to be supported.

5. Findings and Discussion

5.1. Location of Kaliningrad Oblast schools ranked among the top 500 in Russia

Over three years, the ranking of the top 500 Russian schools only included lyceums and gymnasiums (eight institutions in total) located in Kaliningrad, with the one-off exception of the gymnasium in Guryevsk, the closest municipal center to the capital. The ranking generally reflects the educational inequality that developed in Kaliningrad Oblast between 1991 and 2006. With good transport accessibility within Kaliningrad, no assignment of schools to specific districts, relative resource abundance, and additional funding allocated to lyceums and gymnasiums before 2007, the regional center developed a system of elite schools (Fig. 3).

Considerable efforts made over the last ten years under national and regional programs have enhanced the learning environment essentially, probably increasing the overall school performance, yet the “hotbeds of quality” have not yet been redistributed.

5.2. Quality of education in Kaliningrad Oblast schools

Kaliningrad Oblast also compiles a regional school ranking on an annual basis, defining the top 30 schools at each level of education. Unlike the Top 500, this ranking considers not only academic performance but also a number of context indicators: the proportion of students with criminal records, the maintenance of “health groups”, the proportion of children with disabilities, etc. Figure 4 shows the schools of Kaliningrad Oblast (except those located in the capital), specifying their average ranking positions over the last three years.

5.3. Territory quality

Kaliningrad and Svetlogorsk, a popular national resort, were assigned the top level of attractiveness for settlement by the experts. The next rank (high attractiveness) was assigned to the resort town of Zelenogradsk and to Guryevsk, Kaliningrad’s satellite town. The category of increased attractiveness for settlement was represented by the coastal towns of Svetly, Baltiysk, Yantarny and Ladushkin, as well as Mamonovo (bordering Poland) and Sovetsk (bordering Lithuania). Besides this, this category also included Gvardeysk, the nearest municipal center to Kaliningrad on the Moscow–Kaliningrad route, and the remote Gusev, which has been receiving considerable investment in its infrastructure lately. Bagrationovsk, Pravdinsk, Polesk and Chernyakhovsk were assessed as having decreased attractiveness for settlement. The attractiveness of the rest of the municipal centers for investment and living was determined to be low.

While analyzing the indicators of territory quality in different parts of Kaliningrad Oblast, two relatively homogeneous zones can be observed: (i) the West, its coastline bathed by the Baltic Sea, a region

Figure 3. Location of Kaliningrad Oblast educational institutions ranked among the top 500 Russian schools, according to the Moscow Center for Continuous Mathematical Education

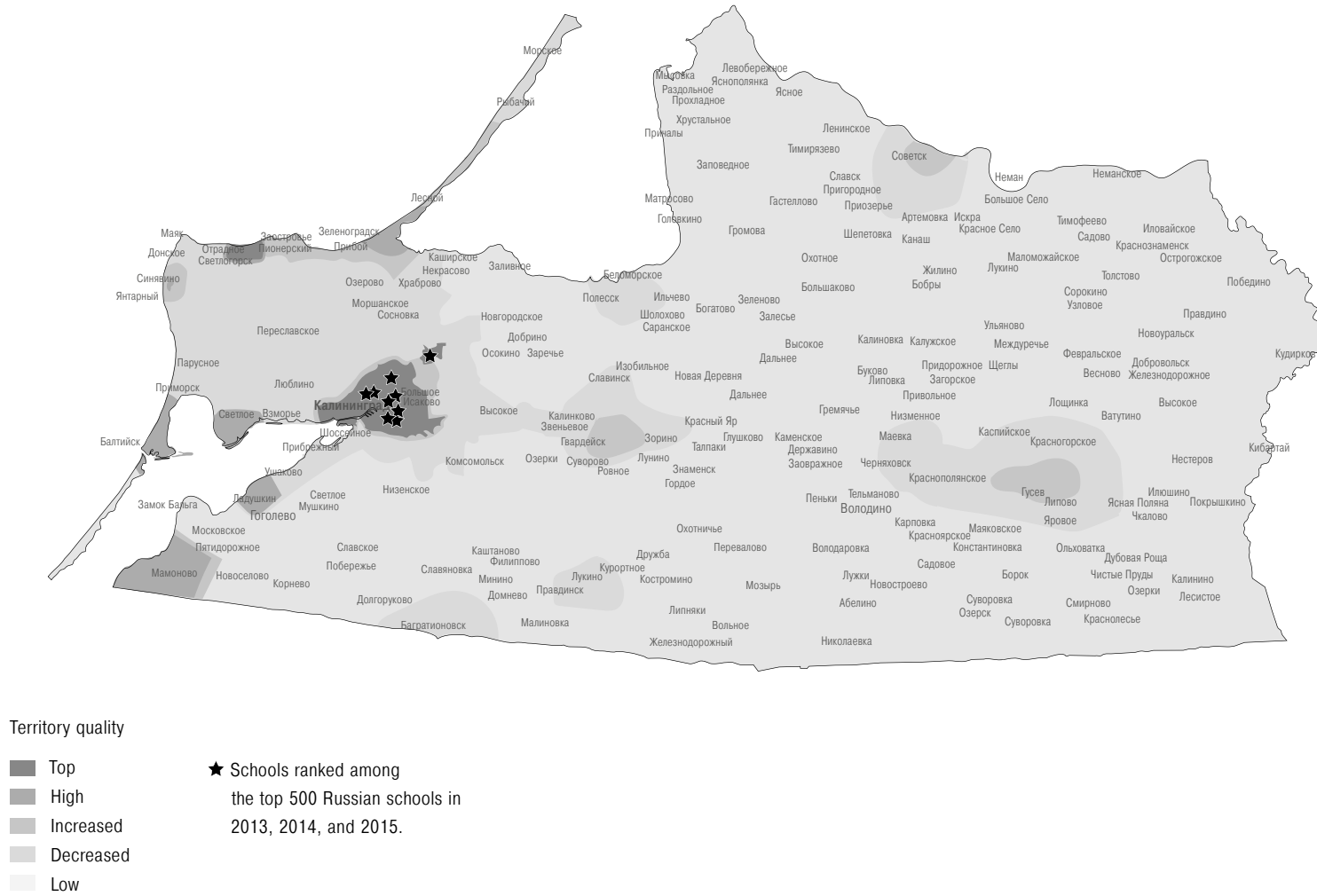
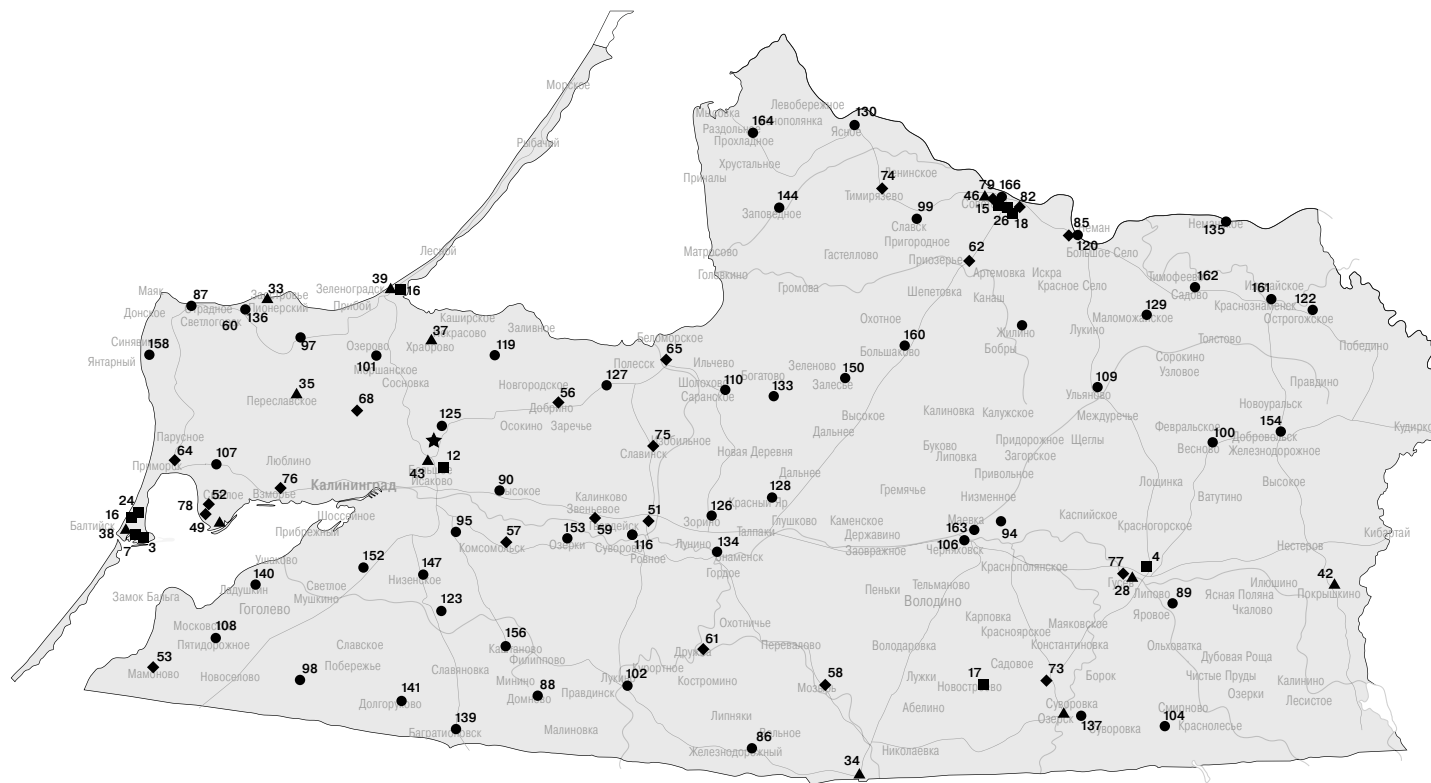


Figure 4. Kaliningrad Oblast schools with ranks according to the quality of education they provide



Качество образования

★ Schools ranked among the top 500 Russian schools in 2015

■ High (ranked among the top 30)

▲ Increased (ranked from 31st to 60th)

◆ Decreased (ranked from 61st to 90th)

● Low (ranked 91st and lower)

51 Average position of school in the regional ranking of education quality in 2013, 2014, and 2015

Figure 6. Relationship between education quality and territory quality

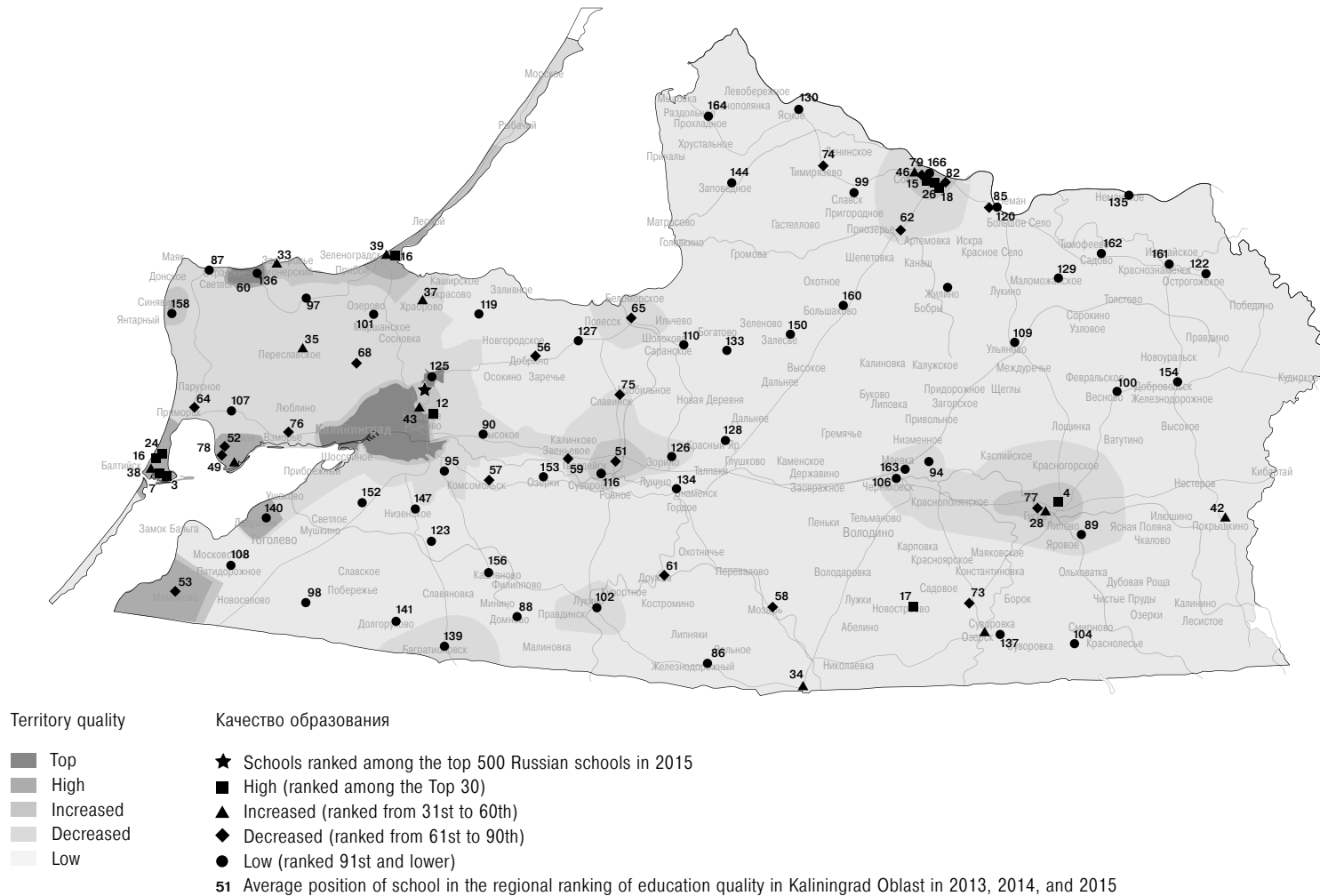
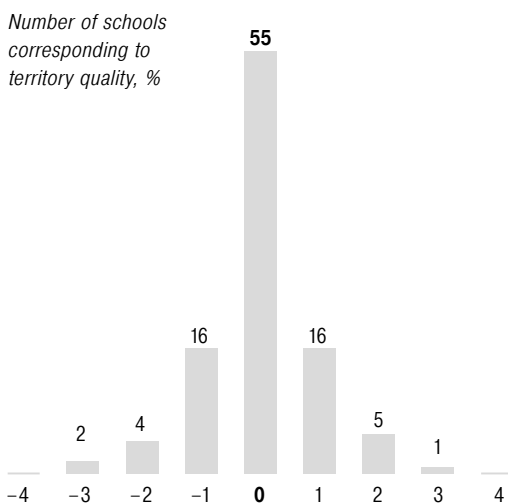


Table 2. Distribution of schools among the categories depending on their resilience to socio-geographic context

School category	Rural schools	%	Schools in small towns	%	Total	%
Resilient schools	13	19.1	13	27.1	26	22.4
Schools corresponding to the territory's resource opportunities	48	70.6	16	33.3	64	55.2
Schools requiring support	7	10.3	19	39.6	26	22.4
Schools that fail to overcome the limitations imposed by the territory quality (par. 2+par.3)	56	80.9	35	72.9	80	77.6

Figure 7. Distribution of schools corresponding to the territory's resource opportunities (0), resilient schools (positive values of the difference between the ranks of education quality and territory quality), and schools requiring support (negative values of the difference between the ranks of education quality and territory quality)

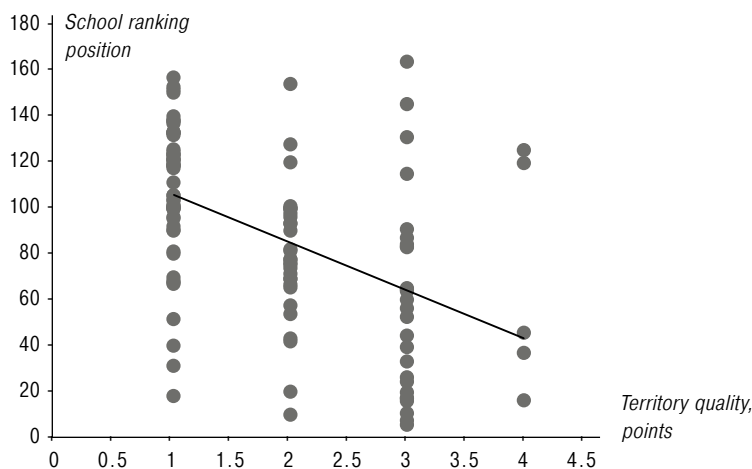


that is very diverse in conditions, experiencing a strong influence of large municipal centers and the regional capital, and (ii) the East, which consists mostly of zones of decreased and low attractiveness (Fig. 5).

5.4. Relationship between ranks of territory quality and education quality

Having overlapped the maps showing the distribution of zones of different territory quality and schools of different performance, we can determine, in a first approximation, the strength of each individual school in terms of its contribution to the existing level of education

Figure 8. **Correlations between school position in the regional ranking and territory quality**



under particular conditions (Fig. 6). All in all, we analyzed data on 116 schools outside Kaliningrad, including 68 (58.6%) rural and 48 (41.4%) located in small towns, or district centers.

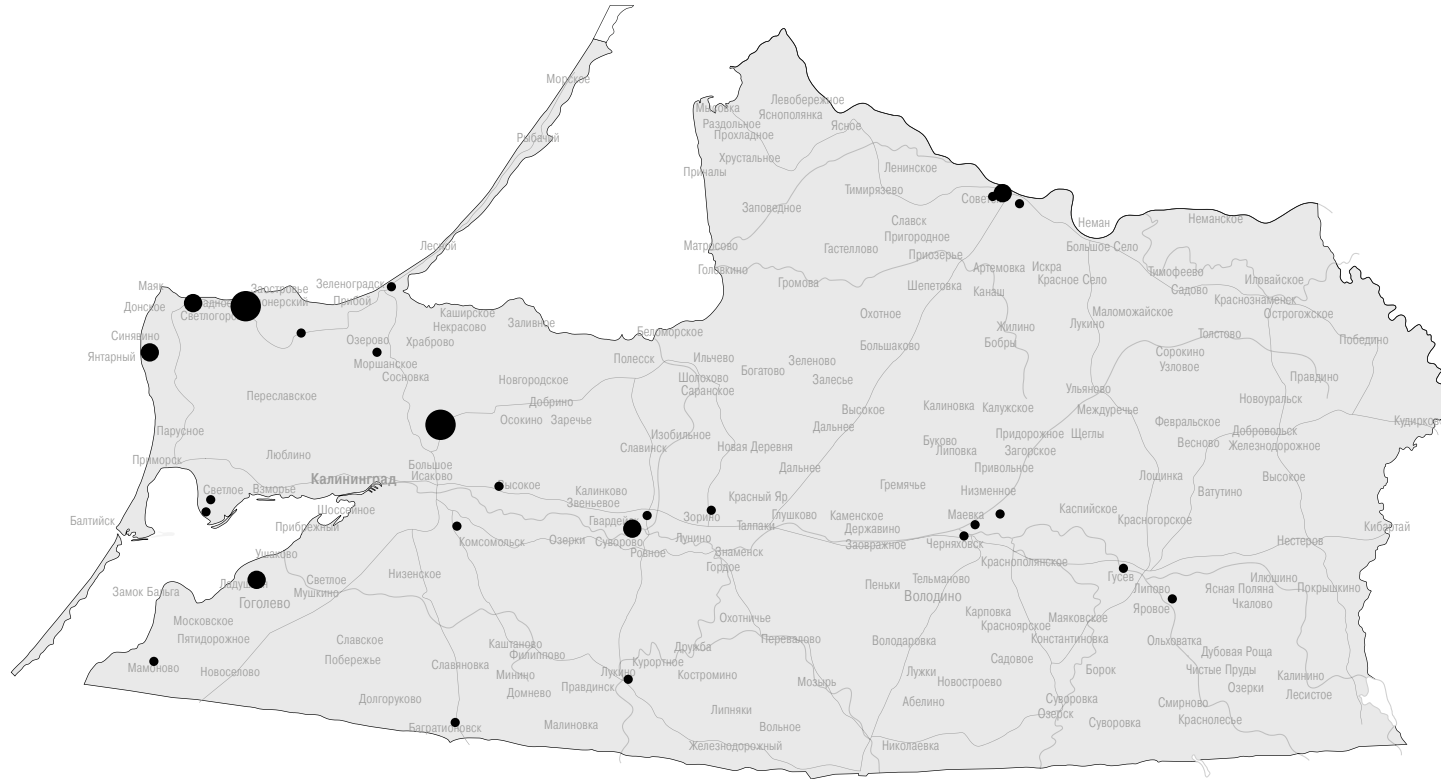
The frequency distribution graph (Fig. 7) shows that education quality does not exceed territory quality in 77.6% of cases (80 of 116 schools outside Kaliningrad). This is true and even more frequent (80.9% of cases) in rural areas outside small towns. Education quality corresponds to that of the territory in 64 cases (55.2%). Both resilient schools and schools requiring support accounted for 22.4% of the sample-26 schools in each group. The graph in Figure 7 demonstrates that school distribution on the basis of compliance of education quality to territory quality is normal. Further analysis revealed that the quality of education in rural schools corresponded exactly to territory quality in 70.6% of cases, while small towns showed a redistribution of resources, resulting in only 33.3% of correspondence.

School ranking and territory quality indicators correlate moderately, Spearman's correlation coefficient being -0.55 (Fig. 8). Territory rank and education quality correlation coefficient is also moderate, being 0.51 .

5.5. Schools requiring support

Figure 9 shows the location of schools demonstrating decreased education quality despite the high or increased quality of the territory and availability of resources for the implementation of education programs in Kaliningrad Oblast. Special attention should be paid to the quality of education, which is lower than expected in Bagrationovsk, Pravdinsk, and especially Yantarny (two positions lower) and Svetlogorsk (three positions lower). Education quality in Svetlogorsk may be unreasonably underestimated as compared to territory quality because the ex-

Figure 9. Location of schools requiring support



- Education quality lower than territory quality by one rank
- Education quality lower than territory quality by two ranks
- Education quality lower than territory quality by three ranks

perts overestimate the territory as an attractive resort area, which is mostly inhabited by a temporary population on summer vacations. The social status of permanent residents and the educational potential of the territory may in fact be much lower than estimated.

The rest of the schools providing an education quality lower than expected were observed near high-status schools in small municipals centers. Possible causes of such strict stratification of schools by level of education are described below through the example of Guryevsk.

5.6. Low education quality zone

Having plotted the territories inhabited by children attending low-performing schools, we realised five zones of relatively low education quality (Fig. 10).

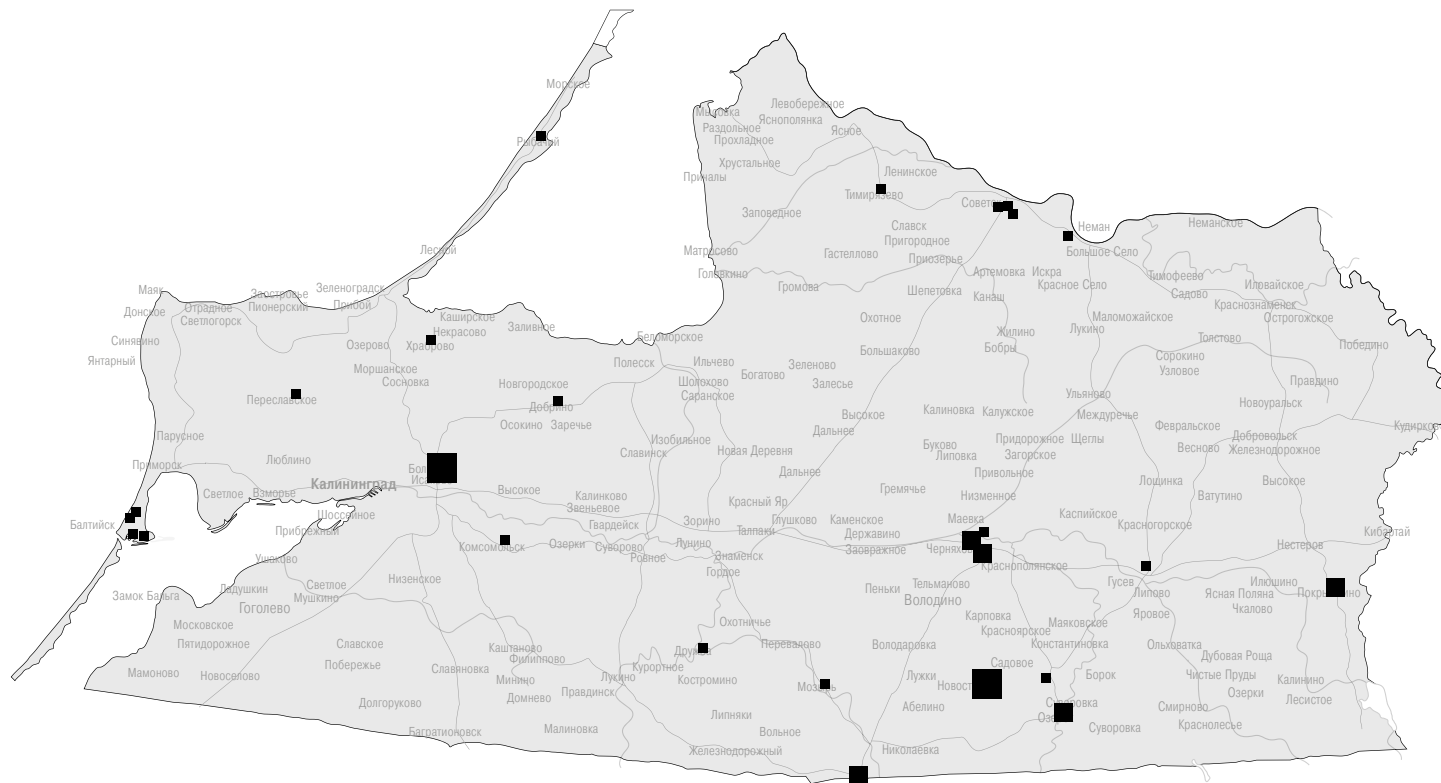
The smallest western zone (No. 3 in Fig. 10) includes three schools, of which the school in Svetlogorsk deserves special attention, showing the maximum difference of three ranks between education quality and territory quality. The reasons for the low performance of a school located in an attractive resort area with good infrastructure require further research, as with the southern zone (No. 4), which includes not only a number of rural schools (11) but also two schools in Kaliningrad. In Pravdinsk and Bagrationovsk Districts, municipal center schools do not donate their resources to other districts and use the advantages of their municipal centers themselves. Poor infrastructure and low socioeconomic development of these centers could be one of the reasons for this. In addition, being equidistant from all of the centers of social wellbeing plus the transit-related nature of the territory located on the central route of Kaliningrad Oblast have probably predetermined low education quality in the central zone (No. 5). Essentially the low resource potential of the east of Kaliningrad Oblast prompted the development of the northern (No. 6) and eastern (No. 7) zones of low education quality, which include educational institutions in regional centers as well as rural schools in the neighboring districts.

5.7. Resilient schools

Two resilience zones have been identified based on the proximity of resilient schools in the absence of low-performing schools nearby: the western zone (No 1 in Fig. 10) and the southern one (No 2). While the existence of the former can be explained by the high cultural capital of service families that have moved to Kaliningrad Oblast (Baltiysk hosts a large naval base), the phenomenon of the southern zone, located entirely within a low-quality territory and surrounded by low-performing schools from all sides, is yet to be investigated. First of all, it is necessary to evaluate the social and cultural status of families, the specific characteristics of the student population, the leadership styles, the levels of principals' leadership, and the specific teaching methods applied.

There are also two resilient rural schools that are of considerable interest regarding a detailed study: one in the rural settlement of Timiryazev in Slavsky District, and one in the rural settlement of

Figure 11. Location of resilient schools



- Education quality higher than territory quality by one rank
- Education quality higher than territory quality by two ranks
- Education quality higher than territory quality by three ranks

Figure 12. **Educational inequality in municipal centers of Kaliningrad Oblast**



Pokryshkino in Nesterovsky District. Both are located in the most eastern part of Kaliningrad Oblast, far from all the centers of relative well-being, in a low-quality territory bordering Lithuania. Locations of all the resilient schools in the region are shown in Figure 11.

5.8. Inequality in small towns

All of the district centers with two or more schools (Guryevsk, Zelenogradsk, Gvardeysk, Chernyakhovsk, Sovetsk, Neman, and Gusev) demonstrate inequality of school performance. Schools of four (!) education quality ranks were found in Sovetsk and Chernyakhovsk (Fig. 12).

Guryevsk is a vivid example of educational inequality in municipal centers with two schools: the highest- and the lowest-performing schools are situated 500 m from each other.

Interviews with education officials in Guryevsk District allowed us to reconstruct the events of the last two decades which have produced the existing situation. From 1996 to 2006, the two schools existed in Guryevsk in the context of unequal access to resources. The principal of one of them, a strong and proactive leader, managed to gain the status of gymnasium for his school and actively began to attract resources. Year after year, the most concerned parents seeking to ensure the best education options for their children tried to get them enrolled in the gymnasium. The student, parent and teacher population of the other school was formed on a residual basis. The gap between the two schools was constantly growing due to the gymnasium principal's leadership qualities and the additional funding allocated to the gymnasium as an advanced educational institution. Considerable investment has been made into the low-performing school over the last five years (renovation, new equipment), but sadly it has not resulted in any meaningful improvement of education quality that would affect the school's position in the regional ranking.

As a result, Guryevsk now has a school that has topped the rankings, including the top 500 Russian schools, for many years, and a

Figure 13. **The phenomenon of equality of strong schools in Baltiysk**

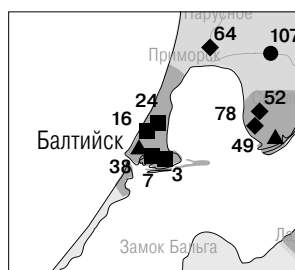


Figure 14. **Education quality inversion east of Pravdinsk**



school that performs the important function of educating children with disabilities but is ranked among the lowest in the region. Municipal and regional authorities continue taking measures to reduce this inequality. A new school, which is now under construction, could possibly change the situation and equalize the chances of access to quality education for all students in this territory.

5.9. “Equality of the strong” in Baltiysk

Educational inequality in Guryevsk appears to be a typical case for schools located nearby. In this regard, Baltiysk represents an exception: all three schools in the town are ranked among the top 30 in the region, with two of them being resilient and one corresponding to the territory status (Fig. 13). Therefore, the high quality of education is achieved not by segregating students and their families by socio-economic status or any other characteristic, or by concentrating resources in one school, sometimes at the expense of the others—a misbalance which is aggravated by the high level of professionalism and leadership of the principal and teachers. High quality is provided here by means of other mechanisms. Such municipal management deserves further research, and it is not improbable that its practices and principles can be transplanted to other municipalities. However, it is not impossible that the situation in Baltiysk is endemic for this “garrison” municipality with a high proportion of servicemen and former servicemen, whose families are characterized by a high level of education of both parents—or determined by other important social peculiarities.

5.10. “Quality inversion” in Pravdinsk

Another anomaly requiring close attention is the resilience zone east of Pravdinsk, where three rural schools—in the rural settlements of Krylovo, Mozyr and Druzhba—are ranked higher than the municipal center schools with better infrastructure and resources (Fig. 14).

Figure 15. **Educational inequality evaluation scheme**

Identifying the centers of relative socio-geographic wellbeing by experts



Territorial zoning

(based on house prices, expert assessments by real estate agents, and/or transport accessibility)



Comparing territory quality and education quality in schools

<p><i>Increased level of education quality:</i> "police vacations", exchange of experience, resource center, advanced training site</p>	<p><i>Education quality corresponds to territory quality:</i> supervisory activities on a scheduled basis, development of conditions for network cooperation</p>	<p><i>Decreased level of education quality:</i> investigation of the causes, development of conditions for network cooperation, provision of resource assistance ("Finnish scenario"), human resource solutions (external administration, strengthening of control ("English scenario"), special-purpose funding (advanced training, student transport, branches of supplementary education institutions); merging schools of different performance levels ("Moscow scenario")</p>
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6. Suggestions on using specific tools to study educational inequality in municipal and regional education policies

Based on the findings in this study, we can suggest the following scheme for evaluating the school performance and resource potential of territories (Fig. 15).

Schools with performance corresponding to the territory's resource opportunities should be exempted from administrative control ("trust-based operation"), and the efforts of methodologists and experts from advanced training institutions should be focused on analyzing the experience of such schools for best practices, and providing advanced training practices on their basis. Additional resource support, combined with strengthening control and overall administrative focus (down to human resource solutions) should be directed at schools performing lower than expected. Special attention should probably be paid to the development of conditions for the exchange of resources among schools in terms of network cooperation.

7. Conclusions

The pilot study conducted proves the effectiveness of the new tool in the contextualization of educational outcomes when assessing school performance. The rank of territory quality may be considered a promising indicator for discounting; it is identified based on real estate experts' assessments of the district where the school is located ("attrac-

tiveness index”) and/or estimated transport accessibility of the main centers of socioeconomic wellbeing (“provinciality index”).

The research hypothesis that education quality cannot be higher than territory quality has been quite reliably tested and validated.

At the same time, we managed to identify a group of resilient schools as well as resilience zones. To establish why they have appeared, additional research is required in terms of internal school context, social status of students’ families, leadership styles, level of network cooperation between a school and other educational institutions, teaching practices, school life, learning environment, and other parameters.

The educational outcome contextualization method described above implies quality-based clusterization of schools and territories, which ignores the problem of borderline values, imposing certain restrictions on taking managerial decisions.

School rankings with no regard for context indicators cannot fully reflect schools’ efforts in achieving high performance results.

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Working Time and Role Strains of Research and Teaching Staff in a Modern Russian University

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Abstract. The article touches upon the changes in roles within the academic profession in Russia arising from the education and science reform. The analysis is made through the example of the National Research University Higher School of Economics (HSE). Both

quantitative and qualitative data is used to suggest a typology of faculties based on their work time allocation. The typology includes five types of faculties: teacher researchers, teachers, researchers, “universal soldiers”, and experts. Each type displays different levels of satisfaction with their work time budget: those who do a lot of teaching and administrative work tend to be less satisfied. This can be explained by the changes in the system of faculty certification in Russia and by how academic staff respond to those changes. Interview results are used to highlight the typical work time allocation problems faced by faculties. These include a low degree of freedom to manage one’s own work time, the lack of boundary in work-life balance, excessive teaching load, an increase in unscheduled tasks, and the problem of delegating workloads which require high research and management skills.

Keywords: work time allocation, academic profession, education and science reform, job satisfaction, types of academic professionalism.

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The academic systems of many countries are undergoing huge changes induced by a combination of factors: the spread of e-learning, the digitalization of library databases, welfare commercialization, and the growing competitive power of the nonacademic sector as a produc-

er of new knowledge and provider of educational services¹. Additional pressure on the Russian academic system is exerted by the rapid transition from the Soviet model to international standards and by the mission of engaging actively in the global education market competition imposed by the state [Kuzminov, Semenov, Froumin 2013]. In general, structural tension is growing and affecting various sectors of higher education in Russia, including the top universities.

Despite a number of initiatives undertaken to reform the existing structure of academic positions, the Russian scientific system inherits many technical features from the Soviet model, adjusting them empirically to the newly-emerging challenges. For instance, the academic degree system is oriented at teaching and industry-specific applied research objectives rather than satisfying the requirement to provide a flexible role distribution in the context of academic state capitalism [Deem 2001], in which Russian universities find themselves today. Behind the established nominations and organizational hierarchies, new roles of academic professionals are evolving to adjust to the challenges of the modern world, while the old ones are losing their former significance [Balatsky 2014].

New roles and even types of academic professionalism are not always considered by the existing organizational and scientific hierarchies and can only be identified indirectly by using unique techniques and approaches, which we attempt to do in this article. We assume that allocation of work time budgets among academic professionals builds a typology of such professionals based on the activities they engage in, thus providing a new perspective on the division of academic labor. Of course, the approach has several important limitations and requires some reservations to be made in terms of methodology and content. First, the methods of survey and interview that we use limit data validity to some extent as they are based on retrospective and subjective evaluations. The diary method would work best here but it involves some organizational and financial complications [Gruzdev, Terentev 2015]. Second, time budgets do not always fully reflect the types of activities that professionals engage in or their individual rhythm and predictability at work. Working in research and teaching has always implied a vague schedule and a high level of task uncertainty in specific periods of time, except for fixed teaching and office hours. Even academic staff themselves cannot always visualize the structure of their work time budgets or describe it clearly. However, in general and along with other methods, academic staff labor budgeting reveals essential transformations of professional roles in this area.

This study uses research and teaching staff work time budgeting to analyze the academic profession transformation in the context of

¹ The factors affecting today's higher education systems are described in [Colini 2016:35].

the education and science reform in modern Russia through the example of the National Research University Higher School of Economics (HSE). Using the results of a quantitative online survey and a series of interviews with teachers and researchers, we try to answer the following questions: how research and teaching staff allocate their time among different types of professional activities; how satisfied they are with the structure of their work time budgets; which problems in this area they encounter; and how they would prefer to spend their work time².

1. Teachers' Time Budgets as a Subject of Sociological Research

The growing workload of academic professionals, together with the lack of time, began to arouse the interest of researchers in the 1990s when the first signs of the managerial turn in higher education appeared. In 1992, Stephen M. Jordan and Daniel T. Layzell found out that the workload of academic faculties in Arizona universities and colleges amounted to 60 hours/week, with half of this time accounting for teaching [Jordan, Layzell 1992]. A consistent increase in workload was also observed in Germany [Teichler 1994], Great Britain [Johnes, Taylor 1990] and other countries [Altbach 1995] around the same time.

In reporting an increase in the workload of academic professionals, researchers demonstrate how work time budgets differ across teacher categories and how the structure of specific activities is changing. Thus, Jane Jacobs concludes, based on her study, that provided that the chances of staying “on the professional periphery” are inversely proportional to time resources that academic staff dedicate to work, the amount of time spent on work becomes the most important factor of intraprofessional differentiation [Jacobs, 2004]. Jeffrey F. Milem, Joseph B. Berger and Eric L. Dey use the results of a national teacher survey to report a considerable change in the structure of time budgets of US university teachers (except for two-year colleges) between 1972 and 1992: the proportion of time allocated for research increased, contrary to the proportion of time spent on teaching and out-of-class communication with students [Milem, Berger, Dey 2000].

Similar changes have been reported by some Russian studies. In particular, some shifts in the allocation of Russian teachers' work time were observed in 1992–2012, when the proportion of time devoted to research increased considerably [Sivak, Yudkevich 2013].

It is critical how changes in the workload of university researchers and teachers affect the quality of their work. University administrators regard increasing the workload of academic professionals as a source of productivity growth, but these expectations can hardly be considered justified, as workload represents a complex system of interrelat-

² Research on time budgets was actively used in Soviet sociology and even applied to analyzing the labor of researchers and highly-qualified professionals [Patrushev 1984; Fomin 1967].

ed aspects of teaching, organizational work, research and expert activities [Soliman, Soliman 1997]. Measuring the quality of academic professionals' work is another problem, as the very notion of "quality" has no univocal operationalization and can be interpreted depending on the demands of specific education system players: university management is interested in increasing the number of publications in top-rated journals, students in good teaching, and department administrators in fulfilling the administrative workload [Harvey, Green 1993; Green 1994]. When a specific indicator of quality prevails in assessing the performance of academic professionals, there is a risk of imbalance in work time and effort distribution, as professionals themselves tend to prioritize this prevailing criterion.

A more recent study [Bozeman, Gaughan 2011] investigates the importance of teachers' work time budget structure for their job satisfaction. Although the balance of hours devoted to research, teaching and other types of activities does not prove to be a significant factor of job satisfaction for the selected sample in this case, the authors point out the huge potential of considering the structure of time budget in further research on job satisfaction.

When assessing work time budgets, it is necessary to make allowance for the differences between academic disciplines [Clark 2011]. The major blocks of academic load—teaching and research—can be either in conflict or in relative agreement with each other [Fairweather, Rhoads 1995; Middaugh 1996]. Mary F. Fox [Fox 1992] shows that in economics, psychology, political science and sociology, teaching and research do not complement each other but rather form conflicting components in the workload of academic professionals. For quite some time already, publications and research have been recognized as having more weight than teaching in academic labor assessment [Diamond 1993], which results in a deterioration of teaching quality.

In a study conducted at the University of Michigan, Kathryn M. Moore and Philip D. Gardner demonstrated that most academic professionals spend 35% of their time on teaching, 26% on research, and the rest on other types of activities [Moore, Gardner 1992]. Meanwhile, the majority of respondents would like to devote more time to research and less to teaching and administrative work. James S. Fairweather and Robert A. Rhoads reveal differences between professors and assistants in terms of how their time is distributed between teaching and other types of workload: teaching takes up more than half of assistants' work time [Fairweather, Rhoads 1995].

Professional academic activities are growing more and more stressful: the image of a relaxed workday of a university teacher or researcher recedes into the past under the pressure of market-oriented management in higher education and science. Jagdish K. Dua demonstrates that 82% of faculties deal with stress in the workplace, with overtime work being one of the main sources of stress in this professional category [Dua 1994].

We have already touched upon work time budgeting for academic professionals in modern Russia [Abramov, Gruzdev, Terentyev 2015]. Based on a survey of teachers and researchers conducted in a Russian university, we suggested classifying academic staff depending on the structure of their work time budgets. Eight categories of faculty were identified: teachers; teachers engaging in research; teachers engaging in administrative work; researchers; administrators; teachers-researchers-administrators; teachers-researchers; and teachers-administrators. We demonstrated that these categories differed in terms of professional priorities, assessment of working conditions, understanding of strategic goals of university development, and attitude toward publication activity promotion policies. The proposed classification was abstract and analytical in nature. To identify the categories, we used mathematical logic and enumerated acceptable workload combinations; next, we searched for relevant observation clusters and compared them by a number of parameters.

In this article, we proceed from a different logic and analyze empirical data instead, which explains differences in the resulting typologies. Besides, we focus more on issues like satisfaction of faculty with their work time budgets and the challenges they face in distributing their time resources among different types of professional activities. To provide a more comprehensive picture, we resort to mixed methods research, using survey results in combination with academic staff interviews.

2. Method and Data

The empirical basis of research included the results of a survey of Moscow HSE campus academic staff and semi-structured (in-depth) interviews with the faculty.

The survey of academic staff was conducted online by the HSE Center for Institutional Research in November–December 2016: the link to the online questionnaire was sent out to corporate and personal mailboxes of all university employees having their base rates in teaching or research positions (regardless of whether they combine the two activities or not). Participation in the survey was voluntary. This article presents the results of analysis which did not cover data on employees holding administrative positions in the HSE (in addition to teaching and/or research ones), as the structure of their work time budgets is conditioned largely by formal employment characteristics (a high proportion of administrative workload). Seven hundred and fifty-six employees agreed to participate in the survey, which accounts for 32% of the Moscow HSE campus faculty not employed in administrative positions. The composition of the resulting sample does not differ essentially from the total population (the differences do not exceed 5%) in such parameters as category, sex, age, academic degree, department (for teachers), or years worked at the HSE. The structure of the

Table 1. **The structure of the sample selected from the HSE faculty (%)**, N=756

Sex	Female	56
	Male	44
Age	25 and younger	14
	26–30	20
	31–40	24
	41–50	16
	51–60	15
	60 and older	12
Academic degree	None	40
	Candidate of Sciences/PhD	44
	Doctor of Sciences	16
Employee category	Researcher	21
	Teacher	59
	Teacher researcher	20

selected sample broken down by sex, age, academic degree, and category is presented in Table 1.

We carried out fifteen semi-structured (in-depth) interviews with HSE academic staff engaged in teaching and research activities in humanities, social and economic sciences in September–November 2016. Five respondents were employed as teachers only, four as researchers only, and six combined teaching with research. The respondents belonged to different age cohorts. The sample included men (6) and well as women (9). The interviews focused on the following: responsibilities and time budget for various operating tasks, subjective work time budgeting preferences, work time budget management, employer's control of work time, attitude toward reforms in science and education and their influence on work time budgets. Some interviews were conducted face to face (11), and some with the help of dedicated online communication facilities (4). All the interviews were recorded using a voice recorder. On average, each interview took about 40 minutes.

3. Academic Staff Work Time Budgeting

The questionnaire for HSE academic staff focused on work time budgeting and satisfaction with the existing distribution of work time among different types of professional activities. The questionnaire asked respondents to specify the proportion of time (%) they had

Table 2. **Work time budgets of the HSE academic staff in 2016**

Questionnaire item: If all the time you spent on professional activities in 2016 is taken as 100%, what will be the rough proportion of time that you devoted to each of the activities listed below? Please only take your activities at the HSE into account. N=756

	Mean	25th percentile	Median	75th percentile
Teaching and academic advising	46	25	50	70
Research	37	15	30	50
Administrative work	9	0	5	10
Expert work and other types of professional activities	8	0	5	10

spent on the following types of professional activities in 2016: teaching and academic advising; research; administrative work; expert work and other types of activities. Only work activities at the HSE counted. The sum of all values was supposed to make 100%. Answers that did not satisfy this requirement were excluded from the analysis.

The survey results demonstrate that academic staff spend on average half (46%) of their work time on teaching, over one third (37%) on research, and 9% and 8% on administrative and expert work, respectively (Table 2). Half of the respondents spend less than 30% of their work time on research activities while a quarter of them spend less than 15% on this. Half of the academic staff spend more than half of their work time (over 50%) on teaching, and while a quarter of them spend over 70% on this. Only a quarter of the employees report that administrative and expert work accounts for more than 10% in the overall structure of their work time budget; half of the respondents spend less than 5% of their time on these types of activities.

The selected sample of academic staff is not homogeneous in terms of the structure of their work time budgets. *K*-means clustering allows us to identify five relevant categories of HSE employees (Table 3), which we conventionally code as teacher researchers, teachers, researchers, “universal soldiers”, and experts. We will dwell on each of the categories below.

Teacher researchers represent the most widespread category in the selected sample of academic staff (41%). Professionals in this category distribute their time almost evenly between teaching and research, showing little or no engagement in administrative or expert work.

Teachers devote most of their work time to teaching and academic advising, while research, administrative and expert activities remain outside their routine. This category is pretty widespread as well, accounting for nearly one third of the sample.

Table 3. **Classification of academic staff depending on the structure of their work time budgets*** (%), N=756

	Teacher researchers	Teachers	Researchers	"Universal soldiers"	Experts
Proportion of time devoted to teaching and academic advising	45	80	84	24	13
Proportion of time devoted to research	40	10	7	24	37
Proportion of time devoted to administrative work	7	5	4	43	5
Proportion of time devoted to expert work and other types of professional activities	8	5	5	8	46
Sampling fraction	41	33	18	8	5

* Based on the results of k-mean clustering with five clusters

Researchers spend nearly all of their work time on research (field studies, publications, conferences), paying little attention to other types of professional activities. They account for 18% of the sample.

The last two categories—*"universal soldiers"* and *experts*—are represented much more poorly in the sample (8% and 5%, respectively). They have specific work time budget distribution patterns. "Universal soldiers", unlike other categories of academic staff, devote a considerable amount of their time to administrative work, while at the same time engaging in teaching and research quite actively. Therefore, they "fight on three fronts", which is where the name of the category comes from. Experts differ from the rest of the categories in that they spend an essential proportion of their time on expert and enlightening activities, thus acting as academic conductors in the public sphere. They mostly engage in research, not teaching.

4. Academic Staff Satisfaction with the Structure of Work Time Budget and the Perceptions of What It Should Be Like

During the survey, academic staff were asked to assess how satisfied they were at the time of the survey with the distribution of their work time among different types of professional activities at the HSE. Assessment was based on a four-point scale with values ranging from "Absolutely dissatisfied" to "Absolutely satisfied" and the "I don't know" option available.

Over one third of the respondents reported being absolutely dissatisfied (8%) or rather dissatisfied (27%) with how their work time was distributed, while over half (61%) were found to be satisfied with the existing structure of their work time budgets, and 4% had no answer. We revealed a statistically significant correlation between satisfaction with the current work time budget structure and employee

Table 4. Correlation between the satisfaction with the existing work time distribution and employee category determined based on the work time budget structure (%)*

Questionnaire item: Please state how satisfied you are with how your work time is now distributed among different types of professional activities at the HSE

	Absolutely dissatisfied	Rather dissatisfied	Rather satisfied	Absolutely satisfied	I don't know
Teacher researchers (N=273)	6	28	49	12	5
Teachers (N=250)	11	30	38	16	5
Researchers (N=135)	3	10	38	47	2
"Universal soldiers" (N=58)	14	54	24	3	5
Experts (N=36)	6	19	58	17	0

* χ^2 test statistic significant at $p < 0.000$ ($\chi^2 = 131.260$, $df = 16$).

category determined based on such structure (Table 4). Researchers (85%) and experts (75%) showed the highest level of satisfaction with the structure of their work time budgets, while the lowest (27%) was observed among "universal soldiers". The satisfaction rates among teacher researchers and teachers were 61% and 54%, respectively. As we can see, an increase in the proportion of work time spent on teaching and administrative work has negative effects on the satisfaction of faculty with their work time distribution.

Faculty members who reported being dissatisfied with the distribution of their work time among different types of professional activities at the HSE at the moment of the survey were additionally asked to describe how they would prefer their work time to be distributed. Most of them would like to increase the proportion of time spent on research (89%), and only 8% would like to reduce the amount of time devoted to this activity (Table 5). Three quarters of the dissatisfied would like to reduce the proportion of time spent on teaching and academic advising (75%), and only 17% would like to engage more in teaching. Half of the respondents would like to spend less time on administrative work, and 29% would prefer to devote more time to expert work. The desire of academic staff to devote more time to research and reduce the amount of time spent on teaching and administrative work proceeds naturally from the recent transformations in the faculty performance assessment system. As with other countries, Russia has got used to the formalized faculty performance assessment system based on the quality and quantity of scientific publications and participation in research projects. Teaching is perceived as an indispensable yet not career-boosting activity. The increased attention of university management to faculty research results in growing indica-

Table 5. Academic staff perceptions of how the structure of their work time budgets should be changed,

Questionnaire item: If you could choose how much time you spend on specific professional activities at the HSE, what proportion of time would you devote to each? N=257

Would like to...	Time spent on...			
	teaching and academic advising	research	administrative work	expert work and other types of professional activities
Increase	17	89	9	29
Leave as it is	8	3	41	47
Reduce	75	8	50	24

tors of publication activity; however, it also turns teaching into an involuntary activity that legitimates the position held but does not bring any credits in the performance assessment system.

Statistically significant differences in the desire to change the distribution of time among different professional activities were revealed between the identified academic staff categories (Table 6). Only three categories (teacher researchers, teachers, and “universal soldiers”) provided the amount of answers sufficient for a comparison. Those who would like to reduce the proportion of work time spent on teaching and academic advising were found mostly among teachers: almost all of them (93%) would like to engage less in teaching. Meanwhile, 96% of them would prefer to devote more time to research activities. The same patterns are observed among teacher researchers, of whom 83% would like to spend less time on teaching and 87% would increase the amount of time devoted to research. These categories of academic staff differ in their attitude toward expert work: the proportion of those who would like to engage in expert activities is slightly higher among teachers (35%) than among teacher researchers. Most “universal soldiers” would like to increase the proportion of time devoted to research (97%), yet only 44% of them would like to spend less time on teaching. Their attitudes toward expert work are inconsistent: nearly one quarter of them would like to increase the amount of work spent on this type of professional activity, while the same proportion would like to reduce it.

5. Why Academic Staff are Not Satisfied with the Distribution of their Work Time

The survey results show that the HSE faculty is not satisfied with the existing structure of their work time budgets because of teaching overloads and excessive administrative work as well as the need to engage in three or more activities at the same time. The dissatisfaction of academic staff with the distribution of their work time are ex-

Table 6. The desire to change the structure of one’s work time budget, depending on faculty category

Questionnaire item: If you could choose how much time to spend on specific types of professional activities at the HSE, which proportion of your work time would you devote to each?

	Proportion of time spent on...											
	teaching and academic advising*			research**			administrative work***			expert work and other types of professional activities****		
	Increase	Leave as it is	Reduce	Increase	Leave as it is	Reduce	Increase	Leave as it is	Reduce	Increase	Leave as it is	Reduce
Teacher researchers (N=93)	11	6	83	87	4	9	2	46	52	25	46	29
Teachers (N=101)	5	2	93	96	2	2	17	51	32	35	52	13
Researchers (N=16)	56	31	13	38	0	62	12	44	44	44	31	25
“Universal soldiers” (N=39)	44	15	41	95	5	0	3	3	94	23	49	28
Experts (N=8)	50	13	37	100	0	0	0	32	68	13	0	87

χ^2 test statistic significance at:

* $p < 0,000$ ($\chi^2 = 85.304$, $df = 8$);

** $p < 0,000$ ($\chi^2 = 77.380$, $df = 8$);

*** $p < 0,000$ ($\chi^2 = 55.292$, $df = 8$);

**** $p < 0,000$ ($\chi^2 = 29.230$, $df = 8$).

plained in the interviews, where the faculty members assessed retrospectively their labor effort in different types of professional activities and talked about how they used their work time.

The major finding derived from the analysis results is that faculty members experiencing different combinations of workload in their professional activities may define the same labor organization parameters as problems. Therefore, we can suggest that dissatisfaction with the structure of work time budget has not so much to do with the compulsory nature of specific activities as it has with the specific conditions of the working environment on the one hand, and the established standards of the professional academic staff culture in respect of a number of activities on the other.

5.1. Low degree of freedom in using work time

Among other problems, the respondents mentioned a low degree of freedom in designing the set of tasks and setting deadlines. Regardless of workload combinations, the teaching routine corresponds less and less to the ideas of vocation and liberal profession and tends to resemble an “ordinary” job such as a typing clerk, as teachers report. This transformation in the very nature of professional activity mani-

fest itself in the increasing amount of tasks, the value of which is not shared by employees, and the disregard of academic staff's capabilities when setting deadlines. This results in a role conflict mentioned by some respondents: duties of a regular performer, requiring timely task accomplishment, come into conflict with the professional's position, requiring a highly conscientious analysis and sometimes a deadline extension for the sake of quality:

"We don't truly have what they call academic freedoms today. This can be clearly seen in time distribution. We are bothered by one-time service tasks, and the more global aspects are involved as well, which include research, when deadlines are set from above and you can only respond to that. This is a fact that is not always easy to live with. Not because of laziness but because this work actually requires more time. My current workday is an ordinary routine, maybe even a factory-type one." (teacher researcher, male, 55 years old)

Judging from the interview materials, we can suggest that academic staff categories classified as researchers and experts based on their workload combinations mainly associate limitations of freedom in using their work time with analytical work and grant reporting deadlines. In this case, dissatisfaction with workload distribution stems from the imbalance between free scientific inquiry and formal accomplishment of research projects in favor of the latter. Faculty categories that spend a lot of time on teaching and treat teaching as their top priority find freedom limitations in the need to reorient themselves to research. This is not about any reluctance to do research; rather, this is about the need to intensify research activities while reserving a considerable amount of time for teaching, as well as about the specific attitude to research "as to the sacred cow"³. Research requires a great deal of effort, which undermines the balance of time budget.

"For me, it (sources of dissatisfaction.—Authors) is deadlines only. There is no chance of extending them. It is simply a fact, a task that you accomplish. I would like to devote a lot of time to preparing a publication, studying other publications to delve into a subject. Ideally, I would probably divide the time 50/50 between reporting and field activities. Now, unfortunately, it works on a residual basis, and this is terrible, in my opinion. I am not satisfied with that." (researcher, female, 35 years old)

"I cannot say that I am not into research at all, but teaching is my top priority. However, everyone has to do research now, otherwise

³ The metaphor used by a respondent.

you'll just be given the sack. For example, I don't really like writing articles, but I have to do this. This is reporting." (teacher researcher, male, 28 years old)

5.2. No boundary between work and life

A large proportion of faculty duties are difficult to quantify. Research activities, which include preparing publications, keeping oneself up-to-date in the relevant professional field, and out-of-class teaching-related activities, such as development of study materials and presentations, form a "continuous time", which has a poorly demarcated boundary with personal life. Many respondents specify this poorly demarcated boundary as one of the reasons for their dissatisfaction with how much time they spend on their professional activities.

"There's no boundary at all (between work and life.—Authors). This summer, there wasn't a moment I was totally "switched off" from work. I believe this is wrong, and my next summer is going to be arranged differently." (teacher researcher, male, 28 years)

5.3. Overload teaching

Burton R. Clark called teaching overloads one of the systemic problems of the American academic profession in the 1990s [Clark 1997]. This observation can be rightfully applied to Russia as well, now that Russian universities have entered the race for rankings and adopted the research performance system based on publication activity indexes. Dissatisfaction with the structure of one's work time budget because of teaching overloads is typical of both faculty members who do spend most of their time on teaching and those who don't. The boundary where teaching load becomes excessive, as perceived by academic staff, is moving, being determined by a number of factors including professional goals, attitude towards teaching, and the quality of courses delivered.

"Teaching is like a fire that needs mending all the time to keep it burning. It took a great deal of time, because it was the most urgent and pressing need at the moment. I was thinking: "I'm having a seminar tomorrow, so I need to prepare this now, elaborate these texts, solve these problems, double-check, discuss—and the research task will wait for two days. So, research was constantly moved aside because teaching occupied all the time available." (teacher researcher, female, 28 years old)

"This (teaching.—Authors) is my profession, so these standards alone don't scare me. It is OK to have 700–800 teaching hours, I used to have over 1,000. But teaching for the same 700–800 hours when you are also supposed to prepare several publications during the year? These are not just publications, after all—you're supposed to elaborate and to conduct a study. So, this is becoming a problem." (teacher, female, 60 years old).

5.4. Unscheduled tasks Last-minute tasks represent an important factor in the dissatisfaction of academic staff engaged in various extents of administrative or expert work, bringing stress and uncertainty into the labor process and producing rush jobs and workathons. This interview data explains the fact established by the survey: faculty categories with considerable amounts of administrative and expert workloads demonstrate relatively high proportions of employees dissatisfied with their work time budgets. As judged by the interviews, the problem lies not so much in a reluctance to engage in these activities as it does in relevant planning challenges.

“I probably get most enervated when something comes up out of the blue. They tell me in the morning that I should do something by the evening... emergency and aggressive deadlines, given that I had totally different plans for the day. And so I have to reschedule everything in the most unpredictable way. Because it happens quite often, it is really uncomfortable.” (researcher, female, 35 years old).

5.5. The problem of delegation Uneven distribution of tasks is another reason for the dissatisfaction of academic staff with their work time budgets which was revealed in the interviews. The problem is not only in the number of tasks but also in their content: young employees are charged comparatively more with routine jobs, while experienced faculty members reputed among their colleagues find themselves overloaded with tasks requiring a high level of responsibility. The latter feel the consequences of what can be called the other side of ‘the Matthew effect’ [Batygin 2001]: uneven distribution of advantages in the form of research projects results in overloads associated with the need to accomplish those projects on time. The respondents report that excessive load is explained in this case by difficulties with delegating tasks that require a high level of research and management competencies.

“It seems to me that revising the work done by subordinate employees is a very unpleasant kind of work. I don’t know if it can be eliminated, but this revision, this redoing of what others are supposed to do—this is awful.” (researcher, female, 30 years old).

“A huge number of projects are charged on a very small proportion of people. This is kind of weird, because the institute is large, but projects are always led and managed by the same people. How come? This is a double-edged sword. On the one hand, these people have proved themselves to have the competencies necessary to take responsibility. On the other hand, their overload is tremendous.” (researcher, male, 25 years old).

6. Conclusion Analysis of the empirical data obtained from a leading Russian university reveals role strains and uneven distribution of labor in the Russian academic system. Formal hierarchies of academic ranks and degrees reflect only partially the complex organization of the modern academic community, which adjusts to organizational and content changes in various ways, including by rethinking time management techniques and seeking to harmonize different types of workload. Categories of academic professionals identified during the analysis (teacher researchers, teachers, researchers, “universal soldiers”, and experts) represent traditional professional roles in the science and higher education sector, which reflect the existing division of labor: some engage more in teaching, some in research, some in administrative work, and others are often invited as public intellectuals by the mass media. However, such division of labor is brought into question today: for instance, the bureaucratic attention is focused on research and publication activities, thus decreasing the prestige of teaching, which means that academic professionals are willing to reduce the workload of this type in their work time budget.

Administrative work at the university can be regarded as an opportunity to strengthen one’s position and improve career prospects, while at the same time it often inhibits full participation in research projects. In addition, faculty members who spend a lot of time on administrative work try to avoid the status of “administrators”, which harms their reputation as academic professionals. Meanwhile, one can’t ignore the fact that science and education reforms in Russia have increased administrative pressure in this sphere as well as the role and influence of bureaucracy in universities, necessitating empirical research on the professionalization of this academic staff category.

Important results of the research conducted include not only explication of proportions of different professional activities in the time budgets of faculty members but also the identification of qualitative characteristics of work time and these professional activities that have a great impact on their perception by the performer. Our study demonstrates that the university labor process is characterized by a growing ambiguity caused by tasks assigned unexpectedly, which are often bureaucratic in nature and divert faculty effort and attention from the main activity. According to the respondents, such work patterns cause stress and alienation from the professional activity, which is not perceived as a vocation anymore but rather as an ordinary desk job. In our view, such a transformation in the perception of one’s professional role may have far-reaching effects. Going deep into solving truly complex scientific problems as well as informal communication with colleagues and students recede into the background of academic staff’s working priorities. Instead, the effort is focused on solving the tactical problems of complying with the existing bureaucratic requirements and achieving the performance indicators imposed from above [Safronov 2016].

The university case analyzed in this article is probably not indicative of the changes in the work time budgets of academic professionals all over Russia. However, similar trends may be observed in other educational and research institutions that respond actively to institutional change, e. g. in universities participating in national university support programs (Project 5–100, the National Research University Competition, etc.). Besides, if other Russian universities and research centers develop isomorphically and look to the practices applied by leading institutions in one way or another, the identified patterns of using work time budgets by academic professionals can become typical of the whole higher education and science system.

Similar trends of alienation from academic labor can be observed in other countries as well. Independent researchers regard them as a disturbing phenomenon, which undermines the ethos of research and will ultimately deprive universities of their competitive edge in the production of new authentic knowledge. Indeed, the corporate culture of universities resembles that of business structures more and more, whereas the most proactive business structures use elements of the classical academic community to promote the production of innovative knowledge.

On the whole, we believe that classification of academic professionals based on work time budgeting may become a promising perspective in research on changes in Russian science and higher education.

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Bibliometric Evaluation of Research Performance: Where Do We Stand?

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Abstract. This work provides a critical examination of the most popular bibliometric indicators and methodologies to assess the research performance of individuals and institutions. The aim is to

lift the fog and make practitioners more aware of the inherent risks in do-it-yourself practices, or cozy off-the-shelf solutions to the difficult question of how to evaluate research. The manuscript also proposes what we believe is the correct approach to bibliometric evaluation of research performance.

Keywords: research evaluation; productivity; FSS; university rankings.

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1. Introduction

In the current knowledge-based economy of a globalized world, research-based innovations are increasingly becoming sources of competitive advantage at both industry and nation levels. Therefore, improving the effectiveness and efficiency of domestic scientific and technology infrastructure ranks among the top priorities in the policy agenda of many governments. Universities and public research institutions, being the heart of this infrastructure, play a vital role in the generation and transmission of new knowledge and discoveries, and consequently an increasingly decisive role in industrial competitiveness, economic growth and employment. At the same time, the rising costs of research and the tight restrictions on public budgets, call for the adoption of more efficient systems of resource allocation. To stimulate continuous improvement, enhance accountability and better manage public funds, a rising number of nations have implemented research assessment exercises. Alongside this, many of them have shifted from conventional funds allocation remunerating institutional size and type of research, to one based on research performance. The assessment exercises serve towards five principal objectives, adopted in whole or in part by the governments concerned: i) stimulation of greater production efficiency; ii) selective funding allocations; iii) reduction of information asymmetry be-

tween supply and demand in the market for knowledge; iv) informing research policy and strategy; and last but not least, v) demonstration that investment in research is effective and delivers public benefits. As a consequence, a demand for increasingly precise indicators of research performance and methods to assess them has exploded. Over recent years, scientometricians have proposed different methods of evaluation and a myriad of indicators and their variants, and the variants of the variants (scientometricians are now running out of alphabet and subscript characters to name all the new indicators/variants). The proliferation of proposals has actually generated a type of disorientation among decision makers, no longer able to discriminate between the pros and cons of the various indicators and methods for planning an actual evaluation exercise. The proof of this is the increasing number of expert commissions and working groups at institutional, national and supranational levels, formed to deliberate and recommend on this indicator, that set of indicators, and this or that methodology to assess performance. Performance ranking lists at national and international levels are published with a media fanfare, influencing opinion and practical choices. Unfortunately, the impression of the current author is that these rankings of scientific performance, produced by “non-bibliometricians” (THE2016; SJTU2016; QS2016; etc.) and even by bibliometricians (University of Leiden, SCImago, etc.), are largely based on what can easily be counted rather than “what really counts”.

In this work, I provide a critical examination of the most popular bibliometric indicators and methodologies to assess the research performance of individuals and institutions. The aim is to lift the fog and make practitioners more aware of the inherent risks in do-it-yourself practices, or cozy off-the-shelf solutions to the difficult question of how to evaluate research. This paper does not say anything new or different from many of the findings in my previous works. I apologize therefore if the reference list at the end contains so many self-citations. I hope the reader finds them worth reading, regardless. What is new about this work, is the systemic overview of where we stand in terms of bibliometric evaluation of research. I will be critical and straightforward in commenting on current practices of research evaluation, as is to be expected from somebody whose “ideas differ fundamentally from mainstream scientometric thinking” [Waltman 2016]. I have also to recognize that the ideas that I am going to present are the outcome of a several years’ joint research effort at the research laboratory that I co-founded with colleague Ciriaco Andrea D’Angelo. Needless to say, I am the only one responsible for these ideas, although most of the credit for the underlying work goes to all the research staff and Phd students that have been or are still member of the lab. Of course, I will not limit myself to criticism of current practices, which would be a hollow exercise, but I will also propose what I believe is the correct approach to bibliometric evaluation of research

performance. The next section of the paper deals with bad practices and invalid indicators of research performance.

The third section proposes what we believe at our lab is the correct approach to research evaluation. The fourth section draws the conclusions.

2. Invalid bibliometric indicators and rankings

Until now, bibliometrics literature has proposed indicators and methods for measuring research performance that are largely inappropriate from a microeconomics perspective. In the following, I will critically analyze the most popular of these. Perhaps the most striking example is the indicator of research productivity. Bibliometricians have become accustomed to defining productivity as the number of publications per researcher, distinguishing it from impact, which they measure by citations. To be honest, I am not able to source far enough back to the scholar who first introduced the above definition, but even in 1926 Alfred J. Lotka used the number of publications in his milestone work [Lotka 1926] where he presented what it is now known as Lotka's law or research productivity. Unfortunately, from an economic standpoint, such a definition makes little sense. It would be acceptable only if all publications had the same value or impact, but that could not be further from the truth. It is like saying that two automobile manufacturers, producing respectively Fiat 500 cars and Ferrari 488 cars, have the same productivity because they produce the same number of automobiles per day, all production factors being equal; or, it is like measuring the GDP of a country by counting the number of widgets produced, regardless of their market value.

Another category of invalid indicators is the one represented by citation size-independent indicators based on the ratio to publications, whose most popular representative is the mean normalized citation score or MNCS. The MNCS is claimed as an indicator of research performance, measuring the average number of citations of publications of an individual or institution, normalized for subject category and publication year [Waltman et al., 2011]. Similarly, the share of individual or institutional publications belonging to the top 1% (10%, etc.) of 'highly cited articles' (HCAs), compared with other publications in the same field and year, is considered another indicator of research performance. Abramo and D'Angelo [2016a; 2016b] object to it. Given two universities of the same size, resources and research fields, which one performs better: the one with 100 articles each earning 10 citations, or the one with 200 articles, of which 100 have 10 citations and the other 100 have five citations? A university with 10 HCAs out of 100 publications, or the one with 15 HCAs out of 200 publications? In both examples, by MNCS or proportion of HCAs, the second university performs worse than the first one (25% lower). But clearly, using common sense, the second is in both cases the better performer, as it shows higher returns on research investment (50% better).

Basic economic reasoning confirms that the better performer under parity of resources is the actor who produces more; or under parity of output, the better is the one who uses fewer resources. Indeed the MNCS, the proportion of HCAs, and all other size-independent indicators based on the ratio to publications are invalid indicators of performance because they violate an axiom of production theory: as output increases under equal inputs, performance cannot be considered to diminish. Indeed an organization (or individual) will find itself in the paradoxical situation of a worsened MNCS ranking if it produces an additional article, whose normalized impact is even slightly below the previous MNCS value.

Another world renowned performance indicator is the *h-index*, proposed in 2005 by the Argentine American physicist, J. E. Hirsch [Hirsch 2005]. The *h-index* represents the maximum number h of works by a scientist that have at least h citations each. Hirsch's intuitive breakthrough was to represent with a single whole number a synthesis of both the quantity and impact of a scientist's portfolio of work. However, the *h-index* and most of its variants ignore the impact of works with a number of citations below h and all citations above h of the *h-core* works. Furthermore, the *h-index* fails to field normalize citations, and to account for the number of co-authors and their order in the byline. Last but not least, because of the different intensity of publications across fields, productivity rankings need to be carried out by field [Abramo, D'Angelo 2007], when in reality there is a human tendency to compare *h-indexes* for researchers across different fields. Each one of the proposed *h-variant* indicators tackles one of the many drawbacks of the *h-index* while leaving the others unsolved, so none can be considered completely satisfactory.

A trend we are all witnessing is the annual publication of international rankings of individual research institutions. Before forging their perceptions or making any decisions based on them, decision makers should pay special attention to the "supposed performance indicators" underlying such rankings. For example, the CWTS Leiden Rankings (2016) are based on such invalid indicators as the total number of publications; the proportion of HCAs; and, up until 2015, the MNCS. Similar drawbacks are embedded in the SCImago Institutions Ranking (2016) by their main indicator, the Normalized Impact, measuring the ratio between the average scientific impact of an institution and the world average impact of publications of the same time frame, document type and subject area. I do not further consider any of the many annual world institutional rankings produced by nonbibliometricians (THE2016; SJTU2016; QS2016; etc.). In these rankings, the performance indicators are given different weight in determining the position of universities. However, their use presents distortions both due to the lack of field-standardization and to strong size-dependency. The SJTU-Shanghai Academic Ranking of World Universities, for example, is notorious for the fact that over 90% of the performance

result depends on university size. It comes as no surprise then if these non-scientific rankings are given more coverage in popular and promotional media, while being heavily criticized in the scientific press.

As for national comparative research performance exercises of universities and institutions, according to Hicks [2012] there are at least 15 nations (China, Australia, New Zealand and 12 EU countries) that conduct them regularly and link the results to public financing. The recent development of bibliometric techniques has led various governments to introduce bibliometrics, where applicable, in support of the more traditional peer review. In the United Kingdom the 2014 Research Excellence Framework (REF), which replaced the peer-review RAE (Research Assessment Exercise) series, was the first UK informed peer-review exercise where the assessment outcomes were a product of an expert review informed by citation information and other quantitative indicators. The problem with peer-review or informed peer-review national-scale evaluation exercises is that they must, through necessity, be based on a subpopulation of products, for reasons of time and costs; otherwise, if the evaluation exercise is based on bibliometric techniques and indicators this limitation no longer occurs. The bibliometric approach offers at least two clear advantages: i) it avoids the distortion of performance due to inefficient selection of products for evaluation, on the part of individual scientists and their institutions; and ii) it avoids distortions due to evaluating only a part of the research product. Abramo, D'Angelo, Caprasecca [2009] first quantified these distortions for the case of Italy's first research assessment exercise VTR2004–2006. Abramo, D'Angelo, Di Costa [2014], in particular, have estimated the error in the selection of products for the hard sciences: the results indicate a decline in the maximum score achievable by 23% to 32%, compared to the score from an efficient selection. Abramo, D'Angelo, Viel [2010] also conducted a sensitivity analysis of performance rankings to the share of research product evaluated. In terms of accuracy, robustness, validity, functionality, time and costs, the superiority of bibliometrics compared to peer review has been demonstrated by Abramo and D'Angelo [2011]. Still, there is a strong resistance by governments and part of the academic community to substitute peer review with bibliometrics, where applicable, in large-scale evaluations.

3. The correct approach to bibliometric evaluation of individuals and organizations

Together with my colleague, Ciriaco Andrea D'Angelo, we have formulated a proxy of the quintessential indicator of efficiency of any production unit—productivity. We have been applying it for several years to measure and rank the performance of Italian academics and research institutions. We devoted a specific work to providing an operative definition of our proxy indicator of productivity and the method to apply it [Abramo, D'Angelo, 2014]. In this section, I will report the main characteristics of it, while I refer the reader to the above mentioned

original paper for further details. Research organizations are no different from any other production systems. They use resources (production factors) to produce output (new knowledge). The microeconomic theory of production describes the relation between the two by the well known production function: $Q = F(K, L)$, where Q is the output, L is labor and K are all production factors other than L . Because of the nature of research systems, to measure productivity one needs adopt a few simplifications and assumptions both on the output and the input side. As for the first, new knowledge, i. e. research output, is intangible. Because one can measure only what is quantifiable, as a proxy of output bibliometricians use publications (indexed in such bibliometric databases as WoS or Scopus). An immediate consequence of this is that in certain disciplines (mainly arts and humanities) where the coverage or research output by bibliometric databases is limited, bibliometric techniques cannot be applied to research evaluation. Publications have a different value or impact on scientific advancement, which bibliometricians approximate with citations. It must be noted that the journal impact factor should never be used as a substitute of or in combination with citations, unless the citation window is extremely short [Abramo, D'Angelo, DiCosta 2011; Abramo, D'Angelo, Di Costa 2010; Levitt, Thelwall 2011; Stern 2014; Abramo, D'Angelo 2016c]. Because citation behavior varies by field, we standardize the citations for each publication with respect to the average of the distribution of citations for all the cited publications indexed in the same year and field.¹ The intensity of publication also varies by field, a prerequisite then of any distortion-free performance assessment is to classify each researcher into a single field [Abramo, Cicero, D'Angelo 2013a]. Furthermore, research projects frequently involve a team of researchers, which is registered in the co-authorship of publications. In this case, we account for the fractional contributions of scientists to outputs, which is sometimes further signaled by the position of the authors in the list of authors.

On the side of production factors, there are again difficulties in measuring that lead to inevitable approximations. The identification of production factors other than labor and the calculation of their value and share by fields is formidable (consider quantifying the value of accumulated knowledge or scientific instruments shared among units). In many countries, even the identification of the researchers in each institution may reveal a formidable task, not to mention their classification into research fields. In Italy, we gain advantage from a database maintained by the Ministry of Education, University and Research, which indexes all academics by their affiliation, academic rank, and field of research. The latter characteristic seems unique to the Ital-

¹ Abramo et al. [2012c] demonstrated that the average of the distribution of citations received for all cited publications of the same year and field is the most effective scaling factor.

ian higher education system, in which each professor is classified as belonging to a single research field. These formally-defined fields are called “Scientific Disciplinary Sectors” (SDSs): there are 370 SDSs, grouped into 14 “University Disciplinary Areas” (UDAs).

Because of the lack of information on the capital K available to each individual or unit, the measure of total factor productivity is generally impossible. Thus, an often-necessary assumption is that the resources available to individual/units within the same field are the same. A further assumption, again unless specific data are available, is that the hours devoted to research are more or less the same for each individual. Finally, as occurs for output, the value of researchers is not undifferentiated and this is reflected in the different cost of labor, which varies among research staff, both within and between units. If cost of labor is available, one should normalize output by it.

When measuring research productivity, the specifications for the exercise must also include the publication period and the “citation window” to be observed. The choice of publication period often has to address contrasting needs: ensuring the reliability of the results being issued from the evaluation, but also permitting frequent assessments to be conducted. For the most appropriate publication period to be observed see Abramo, Cicero, D’Angelo [2012a], while for the citation window that optimizes the tradeoff between accuracy of rankings and timeliness of the evaluation exercise, see Abramo, Cicero, D’Angelo [2012b].

We have named our indicator representing the proxy of the average yearly productivity over a period of time, Fractional Scientific Strength, or FSS. At the individual researcher level R , we then measure FSS_R , accounting for the cost of labor, in the following way:

$$[1] \quad FSS_R = \frac{1}{W_R} \cdot \frac{1}{t_R} \sum_{i=1}^N \frac{C_i}{\bar{C}} f_i,$$

Where:

W_R = average yearly salary of the researcher

t = number of years of work by researcher in period under observation

N = number of publications by researcher in period under observation

C_i = citations received by publication, i

\bar{C} = average of distribution of citations received for all cited publications in same year and subject category of publication, i

f_i = fractional contribution of researcher to publication, i .

The fractional contribution equals the inverse of the number of authors in those fields where the practice is to place the authors in simple alphabetical order but assumes different weights in other cases. For the

life sciences, it is widespread practice in Italy for the authors to indicate the various contributions to the published research by the order of the names in the listing of the authors. For the life science SDSs, we give different weights to each co-author according to their position in the list of authors and the character of the co-authorship (intra-mural or extra-mural) [Abramo et al. 2013b]. If the first and last authors belong to the same university, 40% of the citation is attributed to each of them, the remaining 20% is divided among all other authors. If the first two and last two authors belong to different universities, 30% of the citation is attributed to the first and last authors, 15% of the citation is attributed to the second and last authors but one, the remaining 10% is divided among all the others.²

Operationally, in the Italian case, beginning with the raw data of the WoS, and applying a complex algorithm to reconcile the author's affiliation and disambiguation of the true identity of the authors, each publication is attributed to the author(s) that produced it [D'Angelo et al. 2011]. Thanks to this algorithm, we can produce rankings of research productivity at the individual level, on a national scale. Based on the score of *FSSR* we obtain, for each SDS, a ranking list expressed on a percentile scale of 0–100 (worst to best), or as the ratio to the average productivity of all Italian colleagues of the same SDS with productivity above zero.³ This allows us to compare the performance of all Italian academics regardless of the SDS they belong to.

In multi-field organizational units (i. e. disciplines, departments, universities, regions, nations), where there are researchers that belong to different fields, we are presented with the problem of how to aggregate productivity measures for researchers from the various fields. We have seen that the performance of the individual researchers can be expressed in percentile rank or standardized to the field average. We avoid averaging percentile ranks of the researchers. Thompson (1993) warns that percentile ranks should not be added or averaged, because percentile is a numeral that does not represent equal-interval measurement. Further, percentile rank is also sensitive to the size of the fields and to the performance distribution. We resort then to standardized *FSS*, which accounts for the extent of difference between productivities of the individuals. In formula, the productivity FSS_U over a certain period for a multi-field research unit U :

$$[3] \quad FSS_U = \frac{1}{RS} \sum_{j=1}^{RS} \frac{FSS_{Rj}}{\overline{FSS}_R},$$

² Different practices may occur in other countries whereby the fractional contributions may be adapted accordingly.³ Abramo, Cicero, D'Angelo [2012c] demonstrated that the average of the productivity distribution of researchers with productivity above 0 is the most effective scaling factor to compare the performance of researchers of different fields.

Where:

RS = research staff of the unit, in the observed period;

FSS_{Rj} = productivity of researcher j in the unit;

\overline{FSS}_R = national average productivity of all productive researchers in the same SDS of researcher j .

4. Conclusions The great majority of the bibliometric indicators and the rankings based on their use present two fundamental limits: lack of normalization of the output value to the input value, and absence of classification of scientists by field of research. Without normalization there cannot be any measure of productivity, which is the quintessential indicator of performance in any production unit; without providing field classification of scientists, the rankings of multi-field research units will inevitably be distorted, due to the different intensity of publication across fields. An immediate corollary is that it is impossible to correctly compare the productivity of institutions at international levels. In fact, there is no international standard for classification of scientists and we are further unaware of other nations that classify their scientists by field at domestic level, apart from Italy and the Scandinavian countries. This obstacle can in part be overcome by indirectly classifying researchers according to the classification of their scientific production into WoS or Scopus categories, and then identifying the predominant category. Fractional Scientific Strength (FSS) is a proxy indicator of productivity permitting measurement at different organizational levels. Both the indicator and the related methods can certainly be improved, however they do make sense according to economic theory of production. Other indicators and related rankings, such as the simple number (or fractional counting) of publications per research unit, or the average normalized impact, cannot alone provide evaluation of performance—however they could assume meaning if associated with a true measure of productivity. In fact, if a research unit achieves average levels of productivity this could result from average production and average impact, but also from high production and low impact, or vice versa. In this case, knowing the performance in terms of number of publications and average normalized impact would provide useful information on which aspect (quantity or impact) of scientific production to strengthen for the betterment of production efficiency.

While it may be debatable whether it was Albert Einstein or William Cameron that coined the saying, '*Not everything that can be counted counts, and not everything that counts can be counted*', no one doubts its pertinence and extraordinary importance in the field of scientometrics. Anyone involved in research evaluation should always keep in mind that pill of wisdom, and count only what counts.

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Does Attending a Strong School Guarantee Good College Performance?

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Abstract. The paper tests the hypotheses on better academic performance of graduates from stronger high schools and the nature of relationship between college students' achievements and their academic standing in high school (whether they performed above or below average) with due regard for school characteristics. Regression analysis is used to measure the effects of USE (Unified State Exam) scores, school type, and academic standing on college performance, while controlling for individual student characteristics and cases receiving the Governor's regional scholarship in addition to the standard student allowance. The sample includes 313 first-year Economics and Management students admitted to the National Research

University Higher School of Economics in 2012 and 2013. Cumulative first-year ranking points are used as an indicator of academic performance. As it turns out, graduating from an advanced high school or from a school with a high mean USE score in mathematics provides no guarantee of better educational outcomes for first-year students. High-school academic standing has positive effects on academic achievements in college, the strength of such effects varying depending on school characteristics. Educational outcomes of students who performed above average in low-performing schools can be explained by the high level of intrinsic motivation typical of academically successful students. Therefore, ignoring the information on the academic standing of graduates from low-performing schools may lead to underestimating their academic achievement in college. As for receiving the Governor's scholarship, this proves to be a significant factor in the academic performance of Management students only.

Keywords: Unified State Exam (USE), school quality, academic standing in high school, higher education, college performance, factors of academic performance.

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Empirical studies in education focus largely on analyzing the factors of academic performance. The research avenues include analysis of predictors of academic performance of college students, such as

standardized test results, high school performance, or the type of high school. The findings are controversial.

One of the advantages offered by standardized tests is that they assess student competencies using a unified standardized scale, allowing for comparison at the individual, school, municipal, and national levels. It is assumed that school leavers with better standardized scores have better competencies and will thus perform better in college.

High school grades represent the outcome of a long educational process and efforts made by students with individual levels of intellect and motivation. Hence, high school performance can be regarded as an indicator of student competencies, motivation and working ability [Gordeeva 2013:179]. However, high school grades cannot be compared directly, except perhaps at the individual level, within a group of students or a specific school. At the municipal level already, grade-based comparisons of student performance are impossible due to the diversity of school types, education programs offered, curricula and textbooks used, specific assessment standards and criteria applied, as well as specific teachers' requirements¹. However, comparison is possible for relative academic performance indicators, which characterize the level of individual academic achievement as in ratio to the average level of school performance. Such indicators can also reflect the level of motivation for learning and thus serve as factors of academic performance in college.

Differences in school performance are initially attributed to the differences in education programs. Schools of advanced types—gymnasiums, lyceums, specialized schools—are ranked among the most effective educational institutions most often, according to Russian researchers [Konstantinovsky 1999; Cherednichenko 1999; Konstantinovsky et al. 2006; Yastrebov et al. 2013]. However, the distribution of children among schools in Russia is not incidental. Advanced schools are selected by families with high levels of socioeconomic and cultural capital, firmly oriented at academic achievement. In addition, advanced schools select the most talented children to be admitted to primary, middle and high school. Why do advanced schools demonstrate on average higher levels of academic performance and standardized test (USE²) results than other educational institutions? "We don't know whether it's better teaching or better student population that makes advanced schools stronger." [Derbishir, Pinskaya 2016:114]

We analyzed the correlation between the academic performance of first-year students of a Russian university with their individual USE

¹ For instance, when an A-student transfers from a general education secondary school to an advanced or specialized institution, in most cases they start to obtain lower grades, their competencies remaining the same.

² Unified State Exam

scores in certain subjects as well as with school characteristics. We introduced and considered the indicator “academic standing” as a measure of academic performance of high school students, which uses USE scores in mathematics to show whether a prospective college student performed on average better or worse than their peers. Using the mean USE score in mathematics in a given cohort, we assessed school performance and identified two categories of schools: high performers and low performers. A regional law of 2010 grants an additional regional (“Governor’s”) scholarship to students scoring 225 (260 for economic majors) and more in three USE subjects cumulatively and who have stayed to obtain higher education in the region. The effect of receiving this scholarship was also considered in the analysis of the academic performance of college students.

Based on the data on the academic performance of Economics and Management students of the National Research University Higher School of Economics (HSE) (Perm) as well as the database on the USE results of 2012 and 2013 high school graduates in Perm Territory collected by the HSE Laboratory of Interdisciplinary Empirical Studies, we answer the following questions.

1. Does attending an advanced school guarantee a higher level of academic achievement in college?
2. How does academic standing in high school affect academic performance in college?
3. How does receiving the Governor’s scholarship influence the academic performance of college students?

We have found that graduating from an advanced school does not guarantee high academic performance for first-year HSE (Perm) students majoring in Economics and Management. However, we have revealed a significant positive effect of academic standing, the extent of which depends on school quality. At the same time, the academic standing indicator mediates the relationship between school quality and academic performance in college: management students who graduated from low-quality schools but had high academic standing perform on average better than their peers from high-quality schools but with low academic standing, provided that the mean individual USE scores in mathematics are comparable. Receiving the Governor’s scholarship, which exceeds the standard student allowance by almost four times, is a significant factor of academic achievement in Management but not in Economics.

The article is structured as follows: part one provides an overview of the key studies on correlations between standardized test results and school quality on the one hand, and academic performance of college students on the other; part two describes the sample and presents descriptive statistics; part three outlines the analysis tools; part four contains research results; and, finally, conclusions are drawn in part five.

1. Research on the factors of academic performance of college students

1.1. SAT and ACT in the USA

Extensive experience in studying the correlation between standardized test results and the academic performance of college students has been accumulated in the United States. Standardized tests, such as SAT (Scholastic Assessment Test) or ACT (American College Testing), are widely used for admissions to American colleges.

SAT was originally designed to measure the general innate intelligence of school students, in the first place. The alternative ACT was rather meant for assessing competencies in specific subjects and skills acquired in school. Gradual modifications in both have resulted in virtually no significant difference in their predictive power today [Atkinson 2009].

Tatyana Khavenson and Anna Solovyeva [2014] assessed the predictive power of SAT and ACT in American colleges based on an overview of publications over quite a long period of time to find that it explained 12–25% of variations in the academic performance of first-year college students. However, American educational researchers [Richardson, Abraham, Bond 2012] report high school grades to be a more reliable predictor of academic achievement in college. Consideration of standardized test results together with high school grades has been found to have greater predictive power [Kobrin et al. 2008; Patterson, Mattern 2012; Westrick et al. 2015].

According to Rothstein [2004], the predictive power of SAT is explained predominantly by its correlations with school characteristics. If demographic parameters and school quality are considered along with SAT, its significance as a factor of academic performance in college will decrease by 20% on average.

1.2. The USE in Russia

Two major problems have been solved by the introduction of the USE. First, the test has become a tool for the independent assessment of subject-specific knowledge and skills acquired in school, being used in calculating the final high school grades. Second, as soon as the USE is used for college admissions, it serves as a measure of school leavers' abilities: more capable students are expected to show better academic achievements in college.

The first Russian study [Derkachev, Suvorova 2008] analyzing the significance of USE scores as a predictor of the academic performance of college students was conducted in 2008. A number of subsequent publications presented their findings on the strength of correlations between the cumulative and subject-specific USE scores, on the one part, and college performance, on the other [Poldin 2011; Peresetsky, Davtyan 2011; Zamkov, Peresetsky 2013; Khavenson, Solovyeva 2014].

Using regression analysis and meta-analysis of academic performance of about 19,000 first-year college students in five Russian universities between 2009 and 2011, Khavenson and Solovyeva estimated the predictive power of the cumulative USE score: the mean determination coefficient was found to be 0.20 in all majors, vary-

ing from 0.15 to 0.35 across the departments [Khavenson, Solovyeva 2014]. These findings are consistent with equivalent SAT and ACT estimations. The mean determination coefficient was 0.30 in economics (CI = 0.23–0.37) and 0.25 in management (CI = 0.22–0.27). The predictive power of USE results in specific subjects differs across departments as well, the highest being in mathematics and Russian in the great majority of the majors, while USE scores in major-specific subjects show low predictive capacity.

The predictive power of USE scores has been confirmed by data on the college performance of economics students [Poldin 2011; Peresetsky, Davtyan 2011; Zamkov, Peresetsky 2013]. All the authors agree that the USE score in mathematics has the greatest impact on the academic performance of first-year students. While analyzing the performance of economics students admitted to the HSE in 2009, Oleg Poldin came to the conclusion that subject-specific USE scores had higher predictive power than cumulative USE scores in a few subjects [Poldin 2011]. Oleg Zamkov and Anatoly Peresetsky assessed the influence of USE scores in mathematics, Russian and English on the academic performance of first-year students enrolled in the International College of Economics and Finance (ICEF)³ in 2009, 2010 and 2011. The authors used student gender, admission year, and region of graduation from high school (Moscow or other) as control variables. The results of their research are as follows: USE scores in all three subjects are significant at the level of 1%, while the region of graduation from high school has no significant effect on student achievement [Zamkov, Peresetsky 2013]. A similar finding—the insignificance of the region of graduation from high school in the academic performance of first-year college students—was reported by Derkachev and Suvorova [2008].

1.3. School characteristics

Data obtained in Russian studies [Prakhov 2014; 2015; Derbishir, Pinskaya 2016] demonstrate a strong correlation between USE scores and the type of educational institution. In particular, a positive correlation significant at the level of 1% has been revealed between the USE score in mathematics and the status of the lyceum or gymnasium offering advanced programs [Derbishir, Pinskaya 2016]. Ilya Prakhov [2014] found a 5% significance level positive correlation between the cumulative USE score in all subjects and attending a gymnasium or a specialized school. Of interest is analysis of the relationship between college performance and the type of high school.

1.4. Academic standing

Russian psychologists believe that USE scores reflect the level of general intelligence as well as basic learning skills and competencies ac-

³ ICEF is an HSE department that implements a joint Bachelor's program in Economics with the London School of Economics.

quired in school [Gordeeva, Osin 2012]. The effect of supplementary courses high school students attend to perform better in the USE is significant, yet rather low [Prakhov 2014; 2015]. Having analyzed the factors of academic performance of chemistry students in Moscow State University, Tamara Gordeeva and Yevgeny Osin [2012] found that students with better USE scores showed a higher level of general persistence and concentration skills. It means that high academic performance may be achieved either by innate mental abilities or by effort and perseverance. Meanwhile, these individual characteristics do not manifest themselves out of the blue during the first year in college but develop throughout the long process of schooling. Gordeeva [2013] demonstrated that the structure of motivation of academically successful students differed considerably from that of their peers⁴. Students showing high performance in school possess a higher level of intrinsic cognitive interest in learning and enjoy the learning process much more than low performers, seeing it as valuable and important⁵. The author states that “the most successful students show a much higher level of intrinsic motivation, particularly cognitive and achievement motivation <...> than their lower-performing peers.” [Gordeeva 2013:179] since USE scores serve as high school grades, we can use them to establish whether a student was academically successful in school. To do this, we identify the academic standing of a student, i. e. the ratio of his/her individual USE score to the mean USE score in the cohort. Higher academic performance in college can be expected from students with higher academic standings [Gordeeva 2013].

Thus, the analysis of previous research allows us to predict the relationship between the factors examined and academic achievement of first-year university students. A significant positive correlation between USE scores and college performance can be expected. We also investigate how academic performance of freshmen correlates with school characteristics and academic standing in school (but not school grades).

⁴ The sample included students in grades 6–11 of two non-specialized, non-selective schools in Moscow with conventional education programs, well-reputed among parents. The category of academically successful students included those with an average USE score in Russian and mathematics of 4.25 and higher (on a five-point scale).

⁵ The author believes that such attitude towards learning stems from family values: “This perception of the importance of learning is obviously inculcated in academically successful children by their family environment and parents who demonstrate by personal example the value of learning, broad-mindedness, thinking skills, research activity, intellectual competence, problem solving skills, and academic achievement.” [Gordeeva 2013:180]

2. Empirical data sources and descriptive statistics

The empirical basis of the research consisted of data on academic performance and individual and school characteristics of Economics and Management students admitted to HSE (Perm) on 2012 and 2013. The data was obtained from two sources: the HSE (Perm) administrative database and the databases on the 2012 and 2013 USE in schools of Perm Territory. The administrative database provided information on academic performance, USE scores in specific subjects, type of financing (government funding or tuition), school parameters (location, status, and number). The USE database was used to estimate the mean USE score in mathematics among final-year students in each sampled school. The mean USE score in mathematics is used below in this paper as a characteristic of school quality.

The final sample included data on 313 college students who graduated from Perm Territory schools and were admitted to the HSE as Economics majors in 2012 and 2013. The major-based structure of the sample is presented in Table 1.

Figure 1 shows the proportions of Perm Territory first-year students admitted to the HSE (Perm) as Economics and Management majors who graduated from Perm Territory schools with different mean USE scores in mathematics.

Students from advanced schools (lyceums, gymnasiums, specialized schools) account for 84% and 81% in Economics and Management, respectively. The school location statistics are given in Table 2.

The mean indicators of school quality are higher for advanced schools than for regular ones in both majors: 61.82 as compared to 47.12 points in Economics and 59.94 as compared to 47.21 points in Management (Fig. 2). However, the situation with subject-specific USE scores is less unambiguous. Overall, the mean individual USE scores are at least as high for the category of advanced schools as for the category of regular ones in both majors, except for the mean score in social theory, which is lower for advanced schools in the Economics department: 75.11 as compared to 77.05 points in Manage-

Table 1. Population of first-year HSE (Perm) students majoring in Economics and Management in 2012 and 2013 (people)

Admission year	Major	
	Economics	Management
2012	66	77
2013	84	86

Table 2. The structure of the sample based on school location (%)

	The city of Perm	Perm Territory districts
Advanced schools	76	24
Regular schools	19	81

Boys and girls accounted for 27% and 73% of the sample, respectively. Government-funded places were obtained by 77% of the sample: 105 students in 2012 and 136 in 2013.

Figure 1. **The mean USE score in mathematics among Perm Krai schools in 2012 and 2013 and the proportions of their graduates admitted to the HSE (Perm) as Economics and Management majors**

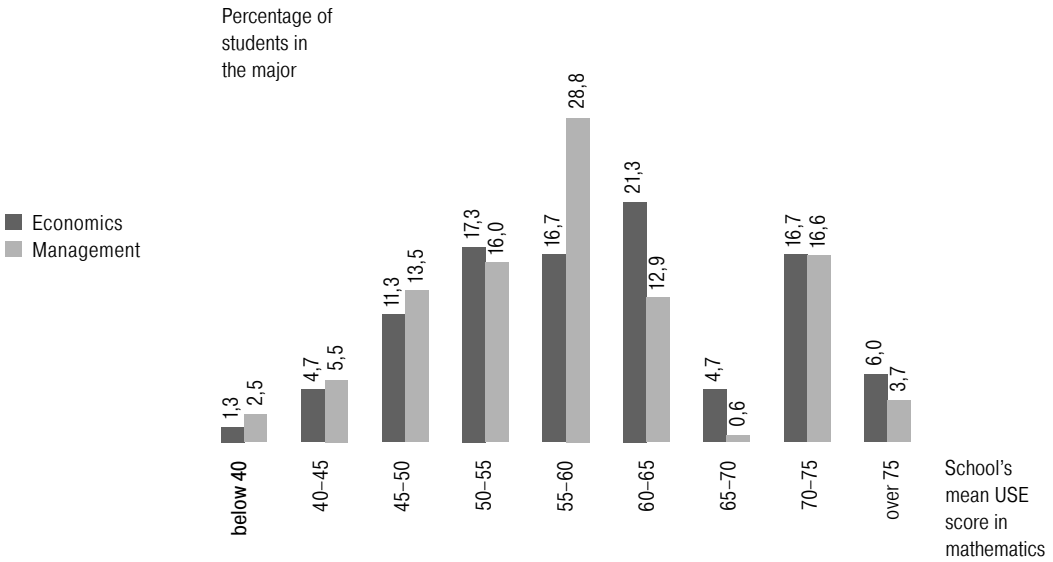


Figure 2. **Mean school and individual USE scores in advanced and regular schools in the sample with due regard for majors.**

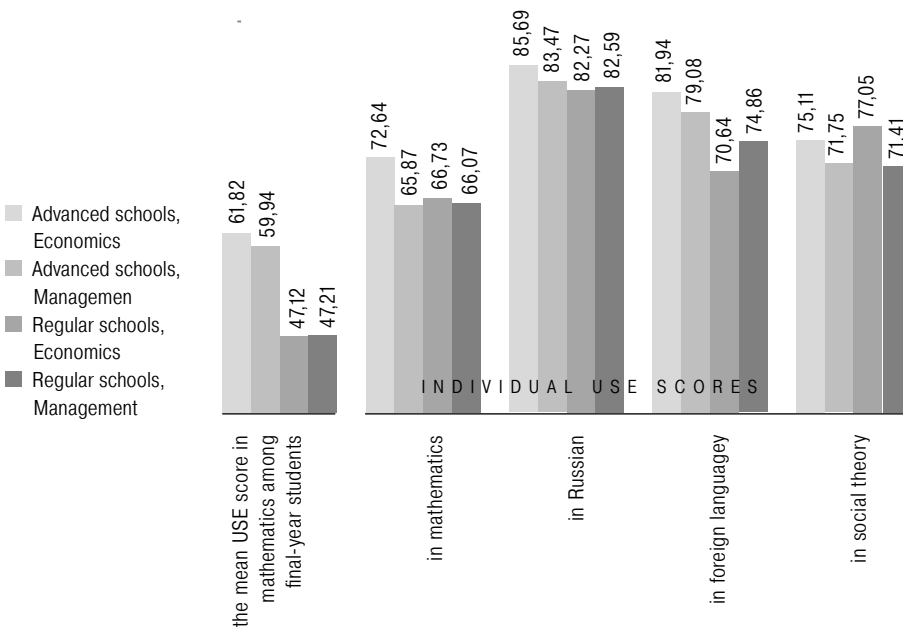


Table 3. Mean USE scores in school subjects and academic performance of first-year students in Economics and Management enrolled in 2012 and 2013

Admission year, major	USE in mathematics	USE in Russian	USE in social theory	USE in foreign language	First-year educational outcome
2012					
Economics	72.621	84.727	74.485	71.500	7.227
Management	65.065	80.558	68.987	67.896	6.783
2013					
Economics	71.107	85.548	76.107	87.179	7.210
Management	66.651	85.779	74.105	87.674	7.007

Table 4. Results of USE score and college performance correlation analysis

Educational outcome in major	USE in mathematics	USE in Russian	USE in social theory	USE in foreign language
Economics	0.386**	0.311**	0.357**	0.268**
Management	0.322**	0.300**	0.315**	0.154*

Note: *, **, *** denote coefficients significant at the level of 10%, 5%, and 1%, respectively.

ment (Fig. 2). Still, graduates from advanced schools generally show better USE scores in university admissions, so they are naturally expected to perform better in college.

As a measure of academic performance, we estimated first-year cumulative ranking points as a sum of all grades in obligatory courses attended during the first year in college, weighted on credits in each course according to the relevant curriculum. The final educational outcomes of first-year students are presented in a ten-point system. The mean USE scores and indicators of first-year college performance are given in Table 3.

Correlation analysis reveals that college performance correlates with the USE score in mathematics as strongly as with USE scores in other subjects for both majors (Table 4).

Having compared the academic performance of HSE (Perm) students who graduated from schools of different categories, we have made a surprising finding: the mean educational outcomes values are virtually the same for graduates from advanced and regular schools in both majors (Fig. 5). Therefore, graduates from lower-status schools admitted with lower USE scores perform on average better during the first year of college than their peers who graduated from lyce-

ums, gymnasiums or specialized schools and had on average higher USE scores.

In order to find possible explanations for this paradoxical finding, we add the indicator of academic standing to the analysis. Given that the USE in mathematics is an obligatory test and that the USE serves as a school grade, we calculate academic standing in high school for each student as the ratio of their individual USE scores in mathematics to the mean USE score in mathematics among final-year students of the same school. The high-school academic standings of college students broken down by majors are presented in Figure 3. An average student in Economics had a better academic standing in high school than an average student in Management: 1.23 and 1.16, respectively; the difference between them is statistically significant at the level of 5%.

The mean academic standing and educational outcome indicators for graduates from advanced and regular schools are given in Figures 4 and 5.

Because school status was found to correlate negatively with the academic performance of first-year HSE (Perm) students, we divide the sampled schools into two groups based on their mean USE scores in mathematics. Schools with the mean USE score of at least 65 points are conventionally referred to as “mathematical” in our study. School grade ‘A’ was given to those on or above this 65-point threshold, when translating the USE results into the five-point scale. All “mathematical” schools have an advanced status and are ranked among the top seven schools of Perm Territory. Graduates from such schools account for 32% of all graduates from advanced schools in the sample. Schools whose mean USE score in mathematics is below 65 are conventionally referred to as “average”, their graduates accounting for 76% of the sample. All regular schools in the sample belong to the “average” category.

The relationship between the academic performance of first-year college students and school quality is described in Figure 6. Figure 7 presents data on the quality of schools whose graduates are enrolled as Economics and Management majors.

The observed differences in the relationship between first-year educational outcomes and school quality between the two majors may be explained by differences in the high-school academic standings of college students. We divided all the students into two groups based on their academic standing in high school: students who performed below average (academic standing within the first quartile, i. e. less than or equal to 1.05) and those who performed above average (all the rest) (see Fig. 3). There are 119 above-average performers in Economics (79% of all Economists) and 111 in Management (68% of all Managers). The structure of the sample based on academic standing is presented in Table 5.

Consideration of academic standing sheds light on the difference in the mean educational outcomes that cannot be explained by dif-

Figure 3. **The distribution of high-school academic standing of HSE (Perm) students estimated as the ratio of the USE score in mathematics to the mean USE score among final-year students, 2012–2013.**

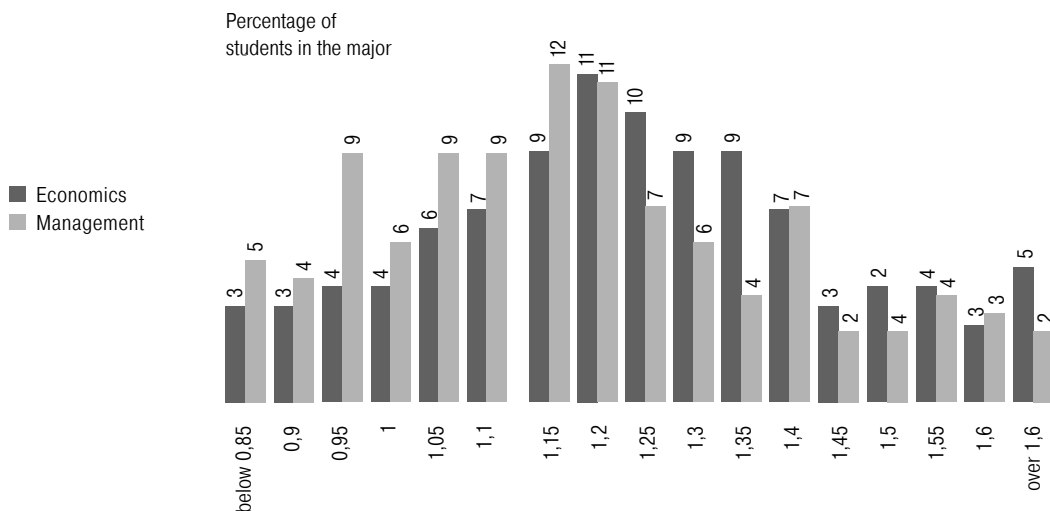


Figure 4. **Mean academic standings of students from advanced and regular schools in the sample with due regard for major, 2012–2013.**

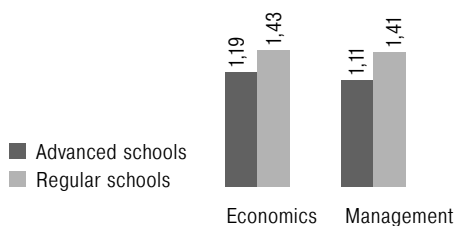


Figure 5. **Mean first-year educational outcomes of students from advanced and regular schools in the sample with due regard for major, 2012–2013.**

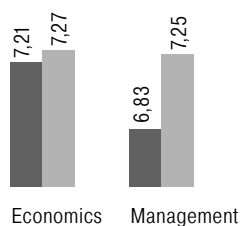


Figure 6. **Mean first-year educational outcomes of students majoring in Economics and Management depending on school quality, 2012–2013.**

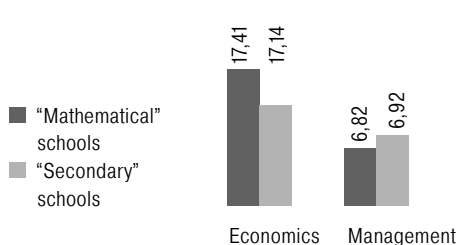


Figure 7. **Mean indicators of school quality (mean school's USE score in mathematics) broken by majors, 2012–2013.**

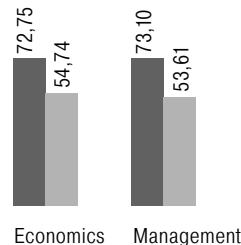


Table 5. The structure of the sample broken down by school quality and academic standings of students (people)

Academic standing	"Mathematical" school	"Average" school
Economics		
Above average	23	96
Below average	18	13
Management		
Above average	10	101
Below average	24	28

Table 6. The proportions of HSE (Perm) students majoring in Economics and Management who received the Governor's scholarship in 2012 and 2013 (%)

Admission year	Economics	Management
2012	56	22
2013	36	40

ferences in school quality. For Management students from "mathematical schools" of similar quality (mean scores 72.30 and 73.43), a difference in the mean academic standing (1.11 and 0.94) results in a considerable educational outcome gap (7.30 and 6.63) (Appendix 1).

We consider receiving the Governor's regional scholarship to be a controlled factor. Students in Economics and Management with the cumulative USE score in three subjects of at least 260 points in 2013 (240 in 2012) are paid the Governor's scholarship during the year, beginning with the very first month. This scholarship supplements the regular student allowance received by all students in government-funded places before the first end-of-term examinations. The Governor's scholarship was 5,000 rubles paid monthly in 2012 and 2013. To continue receiving it, a student must have satisfactory or lower grades for the end-of-term exams. The conditions of qualifying for the Governor's scholarship after the first year are tougher: the mean grade for all the first-year exams must be at least 4.75 (in a five-point system), or 4.5 in case the student engaged in research activity. The Governor's scholarship serves, on the one hand, as an indicator of good high school achievement, while on the other hand it provides an external material incentive for college achievement: high academic performance indicators should be achieved to retain the scholarship for the second year. The proportions of students receiving the Governor's scholarship in Economics and Management departments are given in Table 6.

Next, we test the following hypotheses on how first-year college performance correlates with school characteristics and academic standing.

Hypothesis 1. Graduates from schools with a high mean USE score in mathematics perform better in college.

Hypothesis 2. Students with higher academic standings in high school perform better during their first year in college.

Hypothesis 3. The effect of high-school academic standing on college performance varies depending on school quality, being higher for above-average performers from “average” schools than for below-average performers from “mathematical” schools.

3. Empirical data analysis method

To test the statistical hypotheses, we use the data analysis method widely applied in educational research, namely estimation of linear regression models, equivalents of the educational production function. The models are estimated using the method of ordinary least squares. The cumulative first-year ranking points (educational outcome) of a student are used as an indicator of academic performance, while individual student parameters and school characteristics serve as explanatory variables.

The following specification (1) is offered to estimate the effect of individual USE scores and school characteristics on college performance:

$$(1) Y_i = \alpha + \alpha_1 X_i + \beta S_i + \varepsilon_i,$$

where Y_i indicates the academic performance of student i ;
 X_i is the vector of student i 's USE scores;
 S_i is the vector of student i 's school characteristics;
 ε_i is error.

The following specification (2) is offered to estimate linear effects of academic standing in high school:

$$(2) Y_i = \alpha + \alpha_1 X_i + \gamma \frac{M_i}{MS_i} + \alpha_2 G_i + \alpha_3 C_i + \varepsilon_i,$$

where Y_i indicates the academic performance of student i ;
 X_i is the matrix of student i 's USE scores, except for the score in mathematics;
 $\frac{M_i}{MS_i}$ indicates student i 's academic standing in high school i (the ratio of individual USE score in mathematics M_i to the mean USE score in mathematics among final-year students of the same school MS_i);
 G_i is a dummy variable that takes the value 1 if the student received the Governor's scholarship during the first year and 0 otherwise;
 C_i is the matrix of control variables, which include admission year, form of financing, and student i 's gender;
 ε_i is the error.

Binary variables are introduced to estimate the nonlinear⁶ effects of academic standing and school quality:

$$I_i^H = \begin{cases} 1, & \text{if } \frac{M_i}{MS_i} \geq 1,05 \\ 0, & \text{otherwise} \end{cases} \quad \text{and} \quad I_i^L = \begin{cases} 1, & \text{if } \frac{M_i}{MS_i} < 1,05 \\ 0, & \text{otherwise} \end{cases} \quad \text{are indicators of}$$

academic standing in high school;

$$I_i^M = \begin{cases} 1, & \text{if } MS_i \geq 65 \\ 0, & \text{otherwise} \end{cases} \quad \text{и} \quad I_i^{NM} = \begin{cases} 1, & \text{if } MS_i < 65 \\ 0, & \text{otherwise} \end{cases} \quad \text{are indicators of}$$

school quality, where I_i^M stands for “mathematical” school and I_i^{NM} denotes “average” school.

The following specification (3) is offered to estimate the nonlinear effects of academic standing with due account for school quality:

$$(3) \quad Y_i = \alpha + \alpha_1 X_i + \gamma_1^1 \frac{M_i}{MS_i} I_i^H I_i^M + \gamma_1^2 \frac{M_i}{MS_i} I_i^H I_i^{NM} + \gamma_2^1 \frac{M_i}{MS_i} I_i^L I_i^M + \gamma_2^2 \frac{M_i}{MS_i} I_i^L I_i^{NM} + \alpha_2 G_i + \alpha_3 C_i + \varepsilon_i.$$

The analysis of academic performance factors in the two majors showed that student competencies differed a lot between the Economics and Management departments [Khavenson, Solovyeva 2014]. For this reason, regressions (1)—(3) are estimated separately for Economics and Management students.

The endogeneity problem is typical of most studies on the educational production function. Attempts to find the optimal solving tools depending on the context are made in a number of studies⁷. However, they are rarely used, as finding a good tool is rather difficult.

4. Regression analysis results

Analysis of unstandardized regression coefficients of multiple regressions (1)—(3) allows us to assess and compare the relationship between college performance, on the one part, and individual USE scores in each subject, school characteristics, and academic standing, on the other part. The regressions are analyzed using the method of ordinary least squares; standard errors are corrected and robust; multicollinearity is controlled for. The results of estimating the effects of USE and school status, i. e. regression (1), are presented in Table 1 of Appendix

⁶ “In social interaction models, environment effects are normally considered nonlinear if their strength ($\gamma X_i'$) depends on the relative position of a student in statistical distribution X_i or on distribution $\gamma X_i'$ ” [Andrushchak, Poldin, Yudkevich 2012:6] For instance, the effect of school quality on college performance may be different for students with high and low academic standings.

⁷ E.g. average monthly income per member of household is used as a tool for assessing cumulative material investments in additional exam preparation courses [Prakhov 2014].

2. For both majors, first-year performance has positive effects on USE scores in all subjects except foreign languages, which shows no significant effect on the academic achievement of Management students (specifications 1ea, 1ma). Estimated values of the model's explanatory power (0.284 for Economics and 0.187 for Management) are generally consistent with the conclusions made by Khavenson and Solovyeva [2014] about the predictive power of USE scores. As we introduce the dummy variable of school status into the model, we confirm the finding made during descriptive analysis: students from advanced schools perform significantly (at the level of 10%)—on average by 0.4 points—lower than their peers from lower-status schools, all other conditions being equal. Graduation from a “mathematical” school also has significant (at the level of 10%) negative effect on the college performance of Managers, while showing no significant effect on Economists' educational outcomes. Therefore, Hypothesis 1 has been disproved: graduation from a school with a high mean USE score in mathematics does not guarantee better college performance.

These findings contradict the results of studies by Prakhov [2014; 2015] and by Derbishir and Pinskaya [2016]. The contradiction may be due to sample bias caused by specific characteristics of a regional college:

- Due to a high level of competition in the national tertiary education market, strong graduates of advanced Perm schools seek to enter Moscow and St. Petersburg colleges, while Perm colleges enroll less academically successful graduates of high-status schools;
- Due to a high level of competition in the Perm tertiary education market, strong graduates of advanced schools are redistributed among Perm colleges depending on their level of attractiveness;
- Eighty-one percent of regular schools in the sample are located in districts of Perm Territory. Available research data indicates that district schools mostly supply academically successful graduates⁸ with high levels of academic motivation to the HSE (Perm) (according to findings [Gordeeva 2013]).

The results of estimating the effects of academic standing in high school, i. e. regression (2), are presented in Table 2 of Appendix 2.

The role of the USE as a significant factor of college performance was diminished by the introduction of control variables—student and school characteristics (as components of the academic standing indicator)—into the model. The USE score in Russian lost its significance for students of both majors, and the score in social theory became in-

⁸ The mean USE scores in mathematics of students majoring in Economics and Management are 72.64 and 65.87 points for graduates from advanced schools and 66.73 and 66.07 points for graduates from regular schools, the mean academic standings of the latter being 1.43 and 1.41, respectively.

significant for Management students only. This finding does not contradict those obtained by Rothstein [2004].

We revealed a significant (at the level of 5%) negative effect exerted by the USE score in foreign languages (specifications 2ma, 2mb, 2mc) and academic performance of Managers. Similar results were obtained by Khavenson and Solovyeva [2014] for humanities departments.

The results of estimating the 2ec and 2mc specification assessment prove hypothesis 2: we observe a significant positive effect of academic standing in high school on college performance.

College performance also has positive effects on individual USE scores in mathematics (specifications 2eb, 2mb) and academic standing (specifications 2ec, 2mc). These effects are significant at the level of 5%.

Changes in the USE score in mathematics contribute more to academic performance in college than changes in academic standing for students majoring in Economics. For Managers, the relationship between the effects of the USE score in mathematics and academic standing depends on school quality. The strength of the effect of academic standing means that an increase in the academic standing indicator by 0.1 improves college performance by the relevant coefficient divided by 10, all other conditions being equal. An increase in academic standing by 0.1 is equivalent to an improvement in individual USE score in mathematics M_i by $0.1 \cdot MS_i$ points. For a Management student from a school with the mean USE score in mathematics of MS_i points, an increase in academic standing by 0.1 provides an improvement of 0.108 points in college performance, while the improvement from an equivalent increase in the USE score in mathematics is only $0.02 \cdot 0.1 \cdot MS_i$ points. Equating the values academic performance improvement, we calculate school's mean USE score in mathematics MS_i to be 54. This result means that an increase in high-school academic standing produces on average greater improvement in college performance than an equivalent increase in the USE score in mathematics for Management students from schools with mean USE scores in mathematics below 54 points in our sample, all other conditions being equal. Graduates from such schools account for nearly half of the Management major in the sample (47%). Disregarding the academic standing of Management students from schools with the mean USE score in mathematics below 54 points, we underestimate the level of their academic achievement.

To estimate the strength of effects of individual USE scores in mathematics and academic standings in high school on academic performance of first-year college students, we calculate effect strength estimation indicators f^2 as described by Cohen [1988]:

$$f^2 = \frac{R_{\text{compl}}^2 - R_{\text{incompl}}^2}{1 - R_{\text{incompl}}^2},$$

where R_{incompl}^2 is the determination coefficient for the initial regression with no regressors;

Table 7. Indicators f^2 of the strength of the effects of the USE in mathematics and academic standing in high school on the academic performance of students majoring in Economics and Management

Major	USE in mathematics	Academic standing
Economics	0.074	0.046
Management	0.048	0.072

and R_{compl}^2 is the determination coefficient for a regression including a regressor, the effect of which is estimated.

Indicator f^2 , calculated in this way, allows us to determine how much of the dispersion unexplained in the base regression can be explained by adding a new regressor. The estimated effects of the USE in mathematics and high-school academic standing for regression (2) specifications are given in Table 7.

f^2 values below 0.15 show that the effects of both the USE in mathematics and academic standing in high school on first-year college performance are equally weak, other individual factors like gender, admission year, form of financing (government funding or tuition), and receiving the Governor's scholarship being controlled for. This finding does not contradict those obtained by Rothstein [2004].

Receiving the Governor's scholarship turns out to be a factor significant at the level of 1% for academic achievement of Management students and insignificant for first-year Economists.

All the control variables demonstrate expected coefficient signs. The admission year is insignificant in the analyzed regression models; academic performance of students in government-funded places is significantly higher than that of tuition-paying students; the gender variable is significant in the Management department, where girls perform better than boys.

We analyze regression model (3) to estimate the nonlinear effects of academic standing with due regard for school quality. The results are presented in Table 3 of Appendix 2.

Analysis of the effects of academic standing in high school on the college performance with regard for being an above- or below-average performer as well as for school quality shows that the resulting effects are significant (at the level of 5% in Economics and 1% in Management) and commensurable in Economics and Management majors with one exception only: no significant effects of academic

Table 8. The mean improvement in college performance equivalent to an increase in the USE score in mathematics by 1 point with regard for school quality, academic standing, and major (points)

Type of school	Academic standing	Economics		Management	
		Regression coefficient	Performance improvement	Regression coefficient	Performance improvement
"Mathematical"	Above average	1.517	0.217	1.718	0.241
	Below average (1)	1.835	0.246	1.811	0.247
"Average"	Above average (2)	1.321	0.248	1.432	0.276
	Below average	–	–	1.528	0.273

standing on the college performance is observed in Economics students who performed below average in "average" schools.

All the academic standing coefficients are low except for below-average performers from "mathematical" schools. The effect of their academics standing on college performance exceeds the relevant effect for above-average performers from "average" schools. At first glance, this finding contradicts Hypothesis 3.

Considering that changes in academic standing are equivalent to those in the USE score in mathematics estimated by the school quality indicator ($\Delta M_i = 0,1 \cdot M S_i$), we compare the mean improvements in academic performance in response to a 0.1-point increase in academic standing by expressing them as a function of a 1-point improvement in the USE score in mathematics. The calculation results are shown in Table 8.

To test Hypothesis 3, we need to analyze two groups of students: (i) those from "mathematical" schools (i. e. schools with the mean USE score in mathematics of at least 65 points) whose USE score in mathematics is below the average value among their peers; and (ii) those from "average" schools (i. e. schools with the mean USE score in mathematics below 65 points) whose USE score in mathematics is above average.

On average, a 1-point increase in the USE score in mathematics results in greater performance improvement for Managers in the second group (0.276 points) than for Managers in the first one (0.247 points) and in similar improvements for Economists in both groups (0.247 and 0.246 points, respectively). These findings are consistent with those obtained in the regression (2) analysis. Therefore, Hypothesis 3 is proved for Management students in the sample and disproved for students majoring in Economics.

The findings obtained on Management students are consistent with the ones made by Tamara Gordeeva [2013]. Students in the second group were academically successful in their schools, and their better educational outcomes can be explained by a higher level of intrinsic motivation. Ignoring the information on high-school academic standings of such students may result in underestimating their academic achievement in college.

In our study, we only use data on two cohorts of students (admitted in 2012 and 213) in one college, which describes the academic performance of Bachelor's students in Economics and Management admitted to a specific college in specific years. Despite sample bias, the determination coefficients estimated for all the analyzed regressions correspond to the estimations of predictive power of standardized tests made in American studies and confirmed by Russian researchers.

5. Conclusion

This study was primarily aimed at analyzing school characteristics and academic standing as factors of college performance. We also investigated how school characteristics affected the correlation between college performance and academic standing.

The analysis performed shows that graduating from an advanced school or a school with a high mean USE score in mathematics does not guarantee better academic performance for first-year HSE (Perm) students majoring in Economics and Management.

While modeling academic performance, the consideration of control variables—student and school characteristics—reduces considerably the effects of USE scores in Russian and foreign languages for both majors and additionally in social theory for Managers.

Academic standing in high school, i. e. whether a student performed above or below average, has significantly positive effects on the college achievements of first-year students in both majors. The strength of these effects varies depending on the type of school, i. e. whether its mean USE score in mathematics corresponds to the “excellent” school grade (65 points and higher in our case) (“mathematical” school) or is below 65 points (“average” school). Managers who were academically successful in “average” schools perform on average better than their peers who performed worse in “mathematical” schools. Comparable educational outcomes are demonstrated by students of both groups majoring in Economics.

As the regression analysis shows, the consideration of academic standing in high school allows for reporting that an equal increase in the individual USE score in mathematics results in a greater performance improvement for Managers who were above-average performers in “average” schools than for their peers who performed below average in “mathematical” schools. Academic standing contributes more to college performance than an equivalent improvement in the USE score in mathematics for Management students from schools with the

mean USE score in mathematics below 54 in our sample. Graduates from such schools account for nearly half of the Management major in the sample (47%). They were academically successful in their schools, and their better educational outcomes can be explained by a higher level of intrinsic motivation [Gordeeva 2013]. It means that ignoring the information on high-school academic standings of students from low-performing schools may result in underestimating their academic achievement in college. In our case, college performance of nearly half of Management students may be underestimated.

Consideration of such a predictor as the Governor's scholarship shows that material incentives do not always contribute to college performance. Receiving the Governor's scholarship turns out to be a significant positive factor of academic performance for Management students and an insignificant one for students majoring in Economics.

A similar study on a larger sample would clarify the role of school characteristics and academic standing in college performance. It would be of interest to analyze the influence of factors associated with the level of academic standing in high school, such as sociodemographic characteristics of students, socioeconomic and cultural capital of their families, as well as their correlation with long-term academic performance.

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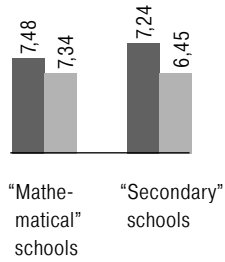
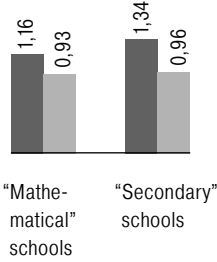
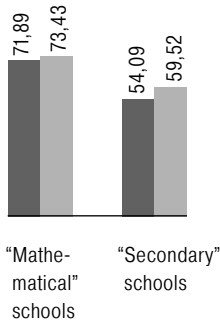
Appendix 1

Economics

School quality

Academic standing

Educational outcome



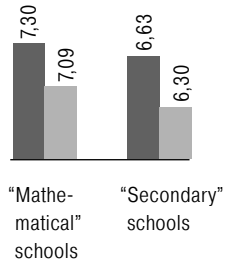
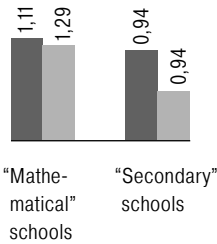
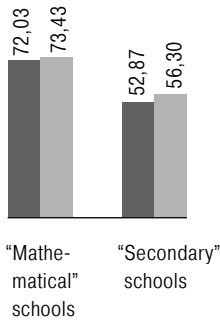
Management

School quality

Academic standing

Educational outcome

■ High academic standing
■ Low academic standing



Appendix 2 Table 1. **The correlations between college performance, USE scores, and school characteristics. Dependent variable: first-year cumulative ranking points on a ten-point scale.**

	Economics			Management		
	(1ea)	(1eb)	(1ec)	(1ma)	(1mb)	(1mc)
USE in mathematics	0.034*** (0.008)	0.036*** (0.008)	0.035*** (0.008)	0.027*** (0.008)	0.026*** (0.007)	0.032*** (0.008)
USE in Russian	0.016* (0.008)	0.017** (0.008)	0.016* (0.008)	0.025*** (0.009)	0.024*** (0.009)	0.024*** (0.009)
USE in a foreign language	0.009* (0.005)	0.011** (0.005)	0.009* (0.005)	-0.008 (0.005)	-0.007 (0.005)	-0.009 (0.005)
USE in social theory	0.036*** (0.009)	0.034*** (0.009)	0.036*** (0.009)	0.026*** (0.009)	0.025*** (0.009)	0.025*** (0.009)
Advanced school		-0.401* (0.221)			-0.416** (0.185)	
School quality ^a			-0.079 (0.176)			-0.324* (0.186)
R ²	0.284	0.295	0.280	0.187	0.208	0.197
Observations	150	150	150	163	163	163

Note. Robust standard errors of the coefficients are given in brackets;

*, **, *** denote coefficients significant at the level of 10%, 5%, and 1%, respectively.

^a school quality indicator.

Table 2. The correlations between college performance, USE scores, and academic standing in high school (linear effects). Dependent variable: first-year cumulative ranking points on a ten-point scale.

	Economics			Management		
	(2ea)	(2eb)	(2ec)	(2ma)	(2mb)	(2mc)
USE in Russian	0.006 (0.011)	0.010 (0.011)	0.007 (0.010)	-0.010 (0.010)	-0.007 (0.010)	-0.011 (0.009)
USE in a foreign language	0.008 (0.007)	0.012* (0.007)	0.011 (0.007)	-0.014*** (0.005)	-0.015*** (0.005)	-0.010** (0.005)
USE in social theory	0.030*** (0.010)	0.034*** (0.010)	0.028*** (0.010)	0.008 (0.009)	0.009 (0.009)	0.008 (0.009)
USE in mathematics		0.030*** (0.009)			0.020** (0.008)	
Academic standing			0.927** (0.374)			1.083*** (0.351)
Governor's scholarship	0.244 (0.227)	0.082 (0.230)	0.219 (0.222)	0.519*** (0.196)	0.452** (0.196)	0.508*** (0.187)
Control variables	Gender, admission year, government funding					
R ²	0.266	0.320	0.300	0.371	0.401	0.416
Observations	150	150	150	163	163	163

Note. Robust standard errors of the coefficients are given in brackets;

*, **, *** denote coefficients significant at the level of 10%, 5%, and 1%, respectively.

Table 3. The correlations between college performance, USE scores, and academic standing in high school with due regard for school quality (nonlinear effects). Dependent variable: first-year cumulative ranking points on a ten-point scale.

	Economics	Management
	(3a)	(3b)
USE in Russian	0.009 (0.010)	-0.011 (0.009)
USE in a foreign language	0.014* (0.008)	-0.011** (0.005)
USE in social theory	0.026*** (0.010)	0.009 (0.009)
Above-average performer × “mathematical” school × $\frac{M_i}{MS_i}$	1.517** (0.712)	1.718*** (0.569)
Above-average performer × “average” school × $\frac{M_i}{MS_i}$	1.321** (0.586)	1.432*** (0.475)
Below-average performer × “mathematical” school × $\frac{M_i}{MS_i}$	1.835** (0.871)	1.811*** (0.628)
Below-average performer × “average” school × $\frac{M_i}{MS_i}$	1.183 (0.812)	1.528** (0.651)
Governor’s scholarship	0.145 (0.234)	0.459** (0.191)
Control variables	Gender, admission year, government funding	
R^2	0.317	0.429
Observations	150	163

Note. Robust standard errors of the coefficients are given in brackets;

*, **, *** denote coefficients significant at the level of 10%, 5%, and 1%, respectively.

Academic Rankings—Where Are They Heading?

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Abstract. The global ranking system is in a state of violent transformation. We can already see the emerging contours of a new ranking system with the four distinguished elements: regional systems, customer-centered systems, multi-league systems and discipline-based systems. To reflect regional characteristics, including language and culture, global ranking systems should become regional ranking systems. To satisfy readers' different expectations towards rankings, ranker-centered systems should become customer-cen-

tered systems. To reflect different institutional missions; size, locations, current unified ranking systems, they should become multiple ranking systems. Institutional ranking systems should become discipline-based ranking systems in order to reflect disciplinary differences. One of the most significant directions of change in rankings is the search for a way to include missions other than research in the international rankings; especially important here are such aspects as excellence in teaching and the so called third mission or the university's social mission.

Keywords: universities, rankings, regional rankings, national rankings, global rankings, multiple ranking systems, rankings by subject, university's social mission.

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If you asked me whether, in the global higher education landscape there is a place for a new ranking, my answer would be: YES. The global ranking system is in a state of violent transformation. Both researchers and experts on higher education and those involved in ranking see it.

In order to illustrate my thesis, I refer to the findings of two researchers in the field of higher education: Jung Shin (South Korea) and Robert Toutkoushian (US). You can find their analysis in their book: *“University Rankings. Theoretical Basis, Methodology and Impacts on Global Higher Education”* (Springer 2011). They point out to two different but complementary approaches to the quality in higher education.

The first, egalitarianism (from French: *égalité*) is closely linked to the phenomenon of massification of higher education. Since up to 50 per cent of high school graduates in many countries continue edu-

cation at a higher level, it is necessary to assure at least a minimum quality of their education at this level. This can be achieved by the introduction of a quality assurance system through the process of accreditation. But accreditation now is, in fact, a kind of certificate confirming that a given higher education institution meets only the minimum required standards. It sets, in other words, a “bottom line” for the level of quality in higher education.

The other, elitism (French: *élitisme*) aims to stimulate the highest quality and answers the call for excellence. Rankings have become a tool that stimulates quality. The combination of a simple message and effectiveness contributes to the rankings growing in presence and popularity. The rankings simplicity is often described by critics as an oversimplification and a shortcoming.

All in all, the positive sides of rankings, I think, overcome their shortcomings and limitations.

Comparing these two approaches, we can clearly see that accreditation alone does not solve the issue of quality in higher education. Despite the existence of several dozen accreditation committees and organisations in Europe, the European Commission has just recently sounded the alarm. The Commission has realized that the gap between European universities and American and Asian universities is widening and hence some radical efforts are required. This means that accreditation has failed—it is efficient, but only for establishing the minimum quality level.

Accreditation does not assure competitiveness. Also, the accreditation system suffers from a good deal of inertia. Rankings do not have such limitations.

In fact, ranking provides a fuller picture of universities, since it takes into account more factors and indicators, and analyzes them even deeper. Rankings, updated annually, are also more up to date.

The analysis done by Shin and Toutkoushian show that, at the moment, we are in a period of transition. We can already see the emerging contours of a new ranking system with the four distinguished elements:

Regional systems. To reflect regional characteristics, including language and culture, global ranking systems should become *regional ranking systems*.

Customer-centered systems. To satisfy readers' different expectations towards rankings, ranker-centered systems should become *customer-centered systems*.

Multi-league system. To reflect different institutional missions; size, locations, current unified ranking systems, they should become *multiple ranking systems*.

And the most interesting element today is the *discipline-based system*. Institutional ranking systems should become *discipline-based ranking systems* in order to reflect disciplinary differences.

I am referring to the interesting analysis of these two researches because I believe their findings have been confirmed in the last years.

As an author of rankings, an analyst and a person involved in the practical side of the ranking process let me present some trends I see emerging in the rankings.

It is a fascinating how rankings and their role have grown. It must be remembered that rankings are still rather young. Interestingly, their timing seems to be correlated with other innovations of our era.

The first professional national ranking, the famous US News Best Colleges, appeared in 1983, at the same time as the Internet emerged. The first global ranking, the Shanghai Ranking, 2003, is a contemporary of Facebook.

The ranking family is growing fast; on average, every year one new international, two regional and three national rankings are published. The growth is impressive.

Analysis of national rankings shows a striking increase in numbers. During the past 15 years, 45 new national rankings have appeared. You will find all these rankings on the IREG Observatory website under "IREG Inventory of National Rankings". The Inventory is constantly updated.

All these new rankings—national, regional and global—try to distinguish themselves from each other through a modified methodology. This generates strong activity in the field of methodology.

Of course, the changes would not be possible if not for the new, ever-improving databases. The availability of electronic databases, especially the Web of Science offered by Clarivate Analytics (formerly Thomson Reuters) and Scopus by Elsevier have created new possibilities. The very existence of these databases and easy access to them have radically altered the system of information on science and higher education. They facilitate the process of ranking.

Another example: *the IREG List of International Academic Awards* published by IREG Observatory on Academic Ranking and Excellence. This is an attempt to go beyond the narrow group of Noble Prize and Field Medal winners. The first edition of the List includes 99 awards with an international character and is an instrument to be used by ranking organizations worldwide.

Changes in the ranking methodologies are also a reflection of the expectations of various groups of stakeholders.

For prospective students rankings serve as a tool in making educated choices in respect of an institution and a field of study.

Researchers use rankings to compare where they stand against researchers in other institutions or countries.

For university managers, rankings are a tool to implant a culture of competitiveness into the staff. It also helps monitor the progress of implementation of the reforms.

Employers expect that rankings will tell them which universities to look to for the best future employees.

Politicians, with the help of rankings, hope to limit the risk of their investment decisions.

Rankings also play an important role in creating the image and prestige of the country. The number of universities a country has in its top group serves as one of the key indicators of the country's standing in the international community. This is why the struggle to occupy high positions in rankings has a special meaning for politicians.

Let's spend a moment on the expectations of politicians and universities. Politicians want to have a simple tool to evaluate institutions and monitor the implementation of reforms. Accreditation cannot serve as such a tool since by its very nature it is a slow and bureaucratic process. Its other disadvantage comes from the fact that accreditation allows for establishing only the lowest acceptable level of the quality of teaching.

And here comes the growing role of the annually published rankings. They offer a handy tool for monitoring reform. They also mobilize and motivate institutions to be better, to be the best!

But rankings have limitations too; they cannot embrace the entire complexity of a higher education institution. They have their weak sides. They can even be harmful—brandishing tremendous power while suffering from substantial, though unavoidable, simplification.

We are also witnessing a race in methodology that brings about some interesting results. It should be mentioned that the improvement and perfection of ranking methodology is, in considerable measure, linked to the needs of the so called *Excellence Initiatives* that the governments in a number of countries created to accelerate the development of a select group of institutions.

Jamil Salmi and Isak Froumin, international experts in the field of higher education, calculated that since 2000 over 30 such excellence programs have been launched in 20 countries. Their total cost exceeds 40 billion US dollars. As a consequence, a group of so called "*Accelerated*" *World-Class Universities* has emerged. These institutions received additional funding to speed up—not unlike booster rockets used in take-off by military jets. Many Excellence Initiatives, including Russia's 5–100 Project, consider rankings a useful tool for monitoring the implementation of the reforms. The Excellence Initiatives have forced rankings adapt changes in their methodologies. These changes were discussed at the *International Conference on Excellence Initiatives* organized at the initiative of Prof. Froumin in St Petersburg last June.

Here are the main directions of change in rankings:

Trend # one. The academic community in many countries have, for a long time, been suggesting that rankings should include a larger group of institutions. For the first decade of their existence, the international rankings had been operating within the magic circle of "Top-100", "Top-200" or, at best, "Top-500". At the same time, there

are close to 20.000 higher education institutions in the world. Analysis of a group of the leading 100 (0.5% of the total number of institutions) may very well be a subject of great interest for higher education experts and the press but it is grossly unfair on a large number of universities as well as the countries where these universities function.

The limit in the number of institutions that are ranked is a result of the methodology these rankings are based on. This is particularly true in the case of the Shanghai Ranking. However, there has been the appearance of rankings, such as the University Ranking by University Performance (URAP) of the Middle East Technical University in Ankara, that have overcome this limitation. The URAP ranking has included 2000 institutions.

Thanks, in great extent, to pressure by the Russian universities of the 5–100 Project, some of the main players such as Times Higher Education and QS have also significantly increased the number of institutions in their ranking. This year THE published a list of 900 universities (it started off with 200). QS published a list covering 800 universities, doubling the original number. The US News Global Universities Ranking published a list of the 1,000 best universities earlier this year.

This trend will only strengthen. In one year's time, the ranking of 1,000 universities will be standard, and in three years international rankings will cover up to 2,000 institutions, or 10 per cent of all higher education institutions. This, I think, will satisfy the ranking ambitions of many countries and their universities.

Trend # two. The emergence and development of rankings “by subject”. The benefits of rankings “by subject” seem to be so obvious that it is hard to understand why the main ranking institutions ignored this group of rankings. It is quite natural that in every university there are some strong and some weaker departments. In the overall rankings these differences get lost. Several months ago, I published an article at University World News under the title: “The Era of Rankings by Subject is Coming”. I am glad my prediction appears to have been accurate.

Two questions emerge here. How many disciplines and how many universities should we analyze?

We can note, with satisfaction, that the number of subjects has been growing fast. This year QS has published a ranking of 43 subjects, URAP Ranking—41, and US News Global Ranking—27. Even the Shanghai Ranking has increased the number of ranked disciplines from 5 (mathematics, physics, chemistry, computer science and economics/business) to include, for the first time, 7 engineering disciplines.

THE this year published a ranking in eight broad fields but it has already announced its intention to publish a ranking in the future that will include several dozen fields of study.

I think it is realistic to assume that in the next few years rankings will include a minimum of 50 subjects and they will cover no less than 500 institutions or faculties.

In spite of the progress in the sphere of rankings, there is still much to be done, especially regarding rankings “by subject”.

The main challenge facing the authors of rankings by subject is how to define the critical characteristic of a given discipline and then to find indicators that best reflect these characteristics.

The professional literature on quality in higher education is in agreement that international rankings are only doing well in the area of “science”. This is quite natural and intuitive as the results in this area are in the form of publications. By comparing the number of publications and calculating the Hirsh Index, it is possible to compare institutions or faculties in such fields as mathematics, physics, chemistry or others falling into the “Science” group.

The use of indicators based on publications as the main criterion to assess the quality in other fields of research seems to be less obvious. Especially when we prepare rankings addressed to prospective students.

If we want to build the house of our dreams and are looking for a good architect, we do not ask him for a number of citations or his Hirsh index. We would rather ask him to show us what he has already built, and we would ask people if they are comfortable living in these houses.

The same is true in medicine. In looking for a good hospital, we are not interested in the publications and Hirsh index of the doctors. Instead, we want to know the patients’ opinions and any assessment made by a professional medical association.

Such examples can easily be multiplied, but what matters most is a conclusion that each discipline has its own hierarchy of values. Building a new ranking “by subject” will not be easy, but if we want rankings “by subject” to meet the expectations, we absolutely have to do it.

Trend # three. There are more and more regional rankings coming. This is quite understandable as both student and staff mobility and academic cooperation primarily take place within a region.

Most attractive, from a marketing point of view, are the regional rankings of Asian and Arab institutions. Also interesting is the Latin American region; less so Africa.

The main problem the rankings of current generation have has to do with the methodology. Their regional rankings look like the twin brothers of the global rankings as, in practical terms, they are extracts from the global rankings on which they are based. I find it difficult to consider them as autonomous, self standing rankings.

Trend # four. Worth noting is the renaissance of the national rankings. Every year a few new national rankings appear. One such ranking has

recently been published in India. Their strength comes from the fact that they can practically cover all of the institutions in the country. In addition, institutions can be evaluated through criteria and indicators that can be more accurately selected since all the institutions function in the same cultural and legal environment. There are some attempts on the way to build “bridges” between national and global rankings.

Trend # five. New dimensions. A search for a way to include other missions in the international rankings i. e. other than *research*; especially important here are such important aspects as *excellence in teaching* and the so called *third mission* or the *university's social mission*.

This is, perhaps, the biggest challenge ahead for the rankings. So far, we do not see any easy answers here. There are no internationally agreed standards either. However, some attempts to find possible solutions are being made.

I am fully aware that this unappreciated or missing dimension of the rankings is particularly hurting Russian universities. Ranking organizations addressing this dimension mostly dance around the numbers related to teaching staff. The search is on for a new approach to the problem.

Speaking of the search for ways to properly reflect the third mission in the rankings, it is worth mentioning that on the initiative of the European Commission an interesting project called the *Third Mission Ranking Project E3M* has been carried out. The project did not lead to a new ranking but a number of findings and conclusions gathered in the “Green Paper” are worth studying. More information on the project can be found at: www.e3mproject.eu and <http://he-ranking.blogspot.com>

The task taken up by the Russian academic community represented by the Union of Rectors to create a new ranking that will, in significant measure, reflect the Third Mission goes well alongside the global trend in ranking. It also offers a chance, though not risk free, to widen the range of criteria now used in rankings.

Why a Philosophy Teacher Would Use Liberal Education Teaching Methods?

A Regional College Case

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Abstract. Philosophy teachers go about their daily routine in a controversial field created by their personal ideas about education quality, topic planning, and the optimal number of hours overlapping with the education standard requirement for developing general cultural competence in students within a general philosophy course. In a situation like this, the issue of choosing specific teaching methods becomes that of complying with professional standards, of being satisfied with the job done, and of private time. The article attempts to problematize the possibility of integrating writing and analytical reading methods borrowed from liberal education into the educational process of a regional college. Sharing the idea of liberal education advocates that apply-

ing these methods to university courses facilitates the development of competencies required by the standard, we analyze our own relevant classroom experience. The paper justifies the effectiveness of teaching methods that develop academic writing and reading skills, arguing that they provide the basis for working independently with educational texts, writing essays, term papers and graduation theses. The most essential hindrances to integrating the above mentioned methods include teacher and student avoidance, as well as regulatory and financial constraints. Syllabus limitations challenge efficiency of the methods for the development of competencies required by the standard. At the same time, the writing and analytical reading methodology is in line with the publicly expressed desire of teachers to organize philosophy seminars without diluting the content. The prospects of large-scale implementation of writing and analytical reading methods in teaching philosophy imply adjustment of the existing syllabi

Keywords: liberal education, writing and analytical reading, teaching philosophy, syllabus.

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Professionals and the Problem of Implementing Innovation in University

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Abstract. Russian universities face the objective of reaching the international standard in the development of science and education, which requires implementation of a number of innovations. Academic staff of universities consists of highly qualified specialists, whose characteristics are believed to include open-mindedness. At the same time, researchers have observed resistance to innovation on the part of the faculty. Some researchers divide university teachers into two groups based on the fundamental self-identification param-

eters: (i) those identifying themselves with the organization, and (ii) those committed to the profession. It is generally believed that teachers committed to the profession are more likely to support innovation. The article argues that both types of self-identification may be a factor of either active promotion of innovations or resistance to them. Resistance to innovation may be caused not so much by faculty characteristics as by the scale and pace of change. Permanent large-scale changes destroy the environment required for professional activities, forcing the academic staff to choose between organizational and professional identity and exciting resistance to innovation in them. The innovation process confronts the university with a crucial problem of retaining professionals, since they first of all identify themselves with the professional community. The article discusses the conditions under which professionals are willing to identify themselves with the organization and to support innovation.

Keywords: innovation in university, resistance to innovation, causes of resistance to innovation, professional identity, organizational identity.

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School Climate: The History of the Concept, Approaches to Defining, and Measurement in PISA Questionnaire

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Abstract. School climate is a significant factor of educational achievement. However, relevant research in Russia is difficult due to the absence of instruments. The paper peeks into the history of the notion of school climate, discussing approaches to defining the term. It also describes the most widespread questionnaires used to measure school climate and provides an analysis of their components. The empirical study is based on the student questionnaire used by the Programme for International Student As-

essment (PISA), which should ideally allow measuring a number of school climate aspects. A psychometric analysis based on the methods of confirmatory factor analysis and modern test theory reveals that the structure of school climate indices is different from what questionnaire designers expected it to be. It can not be clearly determined whether the questions reflect the school climate indicators that the questionnaires were supposed to measure. Some statements are worded in such a way that most school students should either agree or disagree with them, without showing any difference in their attitude toward the subject. The scale is unbalanced for the majority of items. The article suggests making some specific steps to improve this instrument.

Keywords: schoolclimate, PISA, educational measurement, modern test theory, confirmatory factor analysis, item response theory.

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The End of Compulsory Education?

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Abstract. This article is inspired by Francis Fukuyama's book called *The End of History and the Last Man*. Yet, compulsory education is not regarded as a perfect model here. The existing school education system is unable to offer anything else to improve educational outcomes. The study attempts to analyze the conditions under which compulsory education developed as well as its features that impede the improvement of education quality. An alternative education system should

replace compulsory education to reach a higher level of quality. The transition to third-generation education standards may create a situation where a strategic trend for general education in Russia could be finally outlined. The fundamental provisions of the article are mostly expert judgments based on research into official documents, publications at hand, and personal experience. In addition, the article picks up the discussion on the balance between the goals and outcomes of general education initiated in earlier articles published in *Voprosy obrazovaniya* [Lebedev 2005; 2009; 2011; 2013].

Keywords: schools, education system, education system potential, compulsory education, alternative education, system-forming factors, education quality, education standards.

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Why the Soviet School Didn't Solve the Problem of Education Quality

The establishment and evolution of any education system implies solving the problems of education accessibility, quality and effectiveness. When determining the patterns of school education development, it makes sense to assess the potential of the Soviet education system, since its fundamental elements have been inherited by the post-Soviet era.

The major obvious achievement of the Soviet education system consisted in eradicating mass illiteracy of the adult population and providing universal compulsory education for children. According to the census of 1897, literacy of the population aged between 9 and 49 was 28.4%. The literacy rate in the Soviet Union was 87.01% in 1939, increasing to 99.7% in 1970 [Central Statistical Directorate of the USSR 1971:21]. Four-year compulsory primary education was introduced universally in the Soviet Union in 1934. The compulsory education period was extended to seven years in 1950–1956, followed

by eight years in 1958–1962. In the late 1960s, the country began the transition to compulsory secondary education for youth, which resulted in a considerable increase in the literacy rate for the economically active population. In 1987, there were 889 people with higher and secondary (complete or incomplete) education per every 1,000, as compared to 123 in 1939.

Advances in providing accessibility of school education were largely determined by its compulsory nature. Compulsory education as a principle of education system organization implies that the state undertakes to create conditions necessary for the universal education of children and children undertake to study in the conditions created. The focus is sometimes placed on one of these two components in the public perception.

It was a different case with solving the problem of education quality. The quality of any object or phenomenon is understood as the combination of its distinctive characteristics that have specific importance for satisfying the existing demands. Education quality is the combination of capabilities of an educated person acquired as a result of education and sufficient for solving problems of social and personal importance.

Such a definition means that education quality assessment criteria may change together with the understanding of opportunities provided by education and/or essential social and personal problems. Education quality that was considered to be good sometime ago may turn out to be unsatisfactory under new conditions. Discrepancies between new social expectations and existing education outcomes should be identified and resolved in a timely manner to ensure a required level of education quality. This is to say, education quality management may consist not in actually increasing the quality but in achieving a new type of quality, allowing students to develop capabilities for solving new problems emerging in the changing society.

It is rather difficult to give any unambiguous opinion about the quality of Soviet school education due to the absence of precise instruments. Besides, it should be borne in mind that any long-standing education system does solve the problem of quality to some extent, otherwise it wouldn't exist.

The quality of school education in the Soviet Union was consistently evaluated in documents that can be classified as prescriptive. Such documents invariably stressed the important role of school in achieving the missions assigned by the ruling party, while at the same time criticizing the quality of school education over a long period of time.

“The All-Russian Conference states that the quality of student knowledge remains low in most schools of the Republic, which is explained first of all by formalism <...> Formalism manifests itself in students retaining what they learn mechanically, passively, with-

out much comprehension, just memorizing verbal formul as deprived of any specific meaning, being unable to apply knowledge to real life" (All-Russian Conference on People's Education, 1945).

"A major drawback in school performance is the dissociation between learning and real life, which results in graduates being underprepared for practical activity" (20th Congress of the Communist Party of the Soviet Union, 1956).

"The Ministries of Enlightenment (People's Education) of the Soviet Republics fail to take measures necessary to eliminate the existing in consistence between the education programs and curricula, on the one part, and the modern level of scientific knowledge, on the other part, and to reduce student overload with mandatory classes, all of this affecting the depth and durability of knowledge as well as student health" (Resolution of the Central Committee of the Communist Party and the Council of Ministers of the Soviet Union on Measures to Further Improve School Performance, 1966).

"School syllabi and textbooks are sometimes overloaded with redundant information of secondary importance, preventing students from developing creative thinking skills" (Resolution of the Central Committee of the Communist Party and the Council of Ministers of the Soviet Union on Further Improvement of School Education and Preparation of School Students for Working Life, 1977).

"The evolution in education has been slowing down lately, as compared to the international level <...> schools and universities are struggling to make their way out of the cobwebs of instructions, prescriptions and reports of all sorts that were woven around them during the past decades" (Egor Ligachyov's report at the 1988 Plenum of the Central Committee of the Communist Party of the Soviet Union).

The assessment of school education in prescriptive documents is quite consistent with the public opinion of that time about the major drawbacks of the Soviet school, which were growing more and more conspicuous.

Based on 150 articles on education issues published in periodicals (*Pravda*, *Komsomolskaya pravda*, *Literaturnaya gazeta*) between 1970 and 1982, the dominating judgments on schooling can be identified: school overreaches itself in attempting to prepare students for universities of different types; school is supposed to deliver the basics of sciences, but the syllabi include information that cannot be regarded as basic; today's school students more actively express their protest against injustice and hypocrisy and have a stronger sense of self-esteem than earlier generations; the role of a textbook in the learning

process becomes a decisive factor of its effectiveness; the quality of knowledge shown by graduates is decreasing, while school performance indicators remain high; awareness of students about innovations in science, technology and culture is gradually exceeding that of teachers; gone are the days when teachers could expect absolute subordination from students.

The overall conclusion that can be drawn from the above mentioned documents is that school education was falling behind social demand more and more, preserving the same drawbacks decade after decade. This happened because the Soviet school represented an education system based on the ideology of duty. Its fundamental features are described in the article *Obrazovanie kak pravo i obyazannost'* [Education as a Right and Obligation] [Lebedev 2005]. They include: unification of curricula; detailed prescriptions for the learning process; no right for students to choose an educational trajectory; the obligation of students to retain not only facts, rules and scientific notions but evaluative judgments as well; a strict code of student behavior in and outside of school; encouragement of creative thinking only within the framework of the tasks assigned; prevalence of authoritarian methods in teaching; academic performance as the main indicator of educational effectiveness; seeing the goal of education in preparing for the future, not in achieving a new quality of life by students. In fact, the value basis of this education system was governed by the attitude toward school as a tool for preparing children for “grown-up life”, not as an important component of a child’s lifestyle.

The subject-class-and-lesson didactic system was rather easy to regulate and to use as a reliable tool of forced education, inevitable in a situation where all schools are uniform.

As students were losing interest in learning, especially in high school, the scope of school activities regulated from above was widening: not only the learning process but also its outcomes—performance rate—were now subject to regulations. With the reduced responsibility of students towards their academic achievements, the quality of education kept going down, whereas school performance approached 100%. School started losing its moral authority. As a result, the teaching staff underwent a qualitative transformation, undermining the potential of the education system even more.

School performance was assessed using imposed quantitative indicators: education coverage, performance rate, enrolment of graduates in professional education institutions, a set of “educative measures” applied, etc. As a consequence, prescriptive expectations were taken as the reality, eliminating any impartial basis for change management in education.

The Soviet school experience demonstrates that a situation where school performance is assessed by its compliance with imposed indicators is fraught with a considerable risk of reduction in school education quality.

Why the Soviet School Was Built Around the Ideology of Duty

As the orientation of schooling towards the ideology of duty was the main inhibitor of education quality management, a question arises: what were the fundamental factors of the Soviet school education system in general?

The system was conceived to achieve the goal of developing a universal labor school that would provide equal educational opportunities for all children, regardless of their families' socioeconomic status. However, it was specifically emphasized that a universal school would not imply school uniformity.

Anatoly Lunacharsky said at the First All-Russian Congress on Enlightenment held on August 26, 1918: "We don't want schools to be uniform in all governorates and uyezds. On the contrary, the more diversity, the better—yet, naturally, this diversity should have some obvious boundaries. We can't make children sit at desks for several hours, breathing dust and bad air. It won't be diversity, it will be hideosity." His speech was published by *Uchitelskaya gazeta* on March 15, 1988. In the same speech, he spoke for the decentralization of management in education and for the development of school autonomy.

The ideas of school democratization existed parallel to those of individualized instruction: "Maximum individualization of learning is a critical principle of the new school. Individualization should be understood as the process where teachers analyze aptitudes and personal traits of each student to adjust school opportunities and requirements as much as possible to their personal needs" (Lunacharsky A. *Osnovnye printsipy yedinoy trudovoy shkoly* [The Fundamental Principles of a Universal Labor School]). This work of Lunacharsky was also published by *Uchitelskaya gazeta* in 1988, namely on July 12, during preparations for the All-Union Congress of Education Workers, which was held in December that year.

The purpose of publishing Lunacharsky's works was clear: the principles underlying the education system that had developed by the late 1980s stood in stark contrast to the ones declared 70 years earlier: management centralization instead of decentralization, authoritarianism instead of the democratization of relationships in education, unification instead of individualized learning.

Therefore, a question is raised: why did the logic of providing a universal compulsory education lead to such a distortion of the fundamental principles of the education system?

Educational policy experienced a sharp turn in the early 1930s, when the famous resolutions of the Central Committee of the All-Union Communist Party of Bolsheviks on school education issues were adopted. Their adoption was concurrent with the changes in the sociopolitical development of the country: the elimination of all opposition, the refusal of the New Economic Policy, the collectivization of the agricultural sector, the widespread use of terrorist techniques in management, etc. Processes like those could not leave the education sphere untouched. The overall meaning of the changes of the

late 1980s was described as the establishment of “Stalinist pedagogy” designed to turn the teacher into a state agent, whose autonomy was first suppressed and later unwanted by the teacher [Radzikhovsky 1988]. However, it would hardly be right to attribute the changes in the educational policy solely to the political factors specified above. The inner logic of development mattered as well, first of all in respect to the didactic component of the education system.

A serious attempt to withdraw from the subject-class-and-lesson system was made in the 1920s: comprehensive programs were becoming widespread, standard textbooks were often renounced, and team-based lab learning methods were used. The didactic changes were interrelated with the decentralization of the learning process management, the democratization of relationships among the learning process participants, and the orientation towards creative methodology for teachers.

The return to the subject-class-and-lesson system in the 1930s is explained by the fact that school performance did not conform to the requirements of higher professional education institutions. Using modern terminology, we can say that those requirements were not satisfied by the subject-specific outcomes of school education. Professional education requirements were determined by the demands of industrial society development. The incompliance of subject-specific outcomes of school education to those demands can be explained by the few chances for exploiting the potential of the alternative system due to the insufficient competencies of the teaching staff: there is no data on teacher education in the 1920s available, but the proportion of teachers with higher education diplomas was 14.2% in the academic year 1950/51 [Central Statistical Directorate of the Soviet Union 1971:105].

The turn to the subject-class-and-lesson learning system provoked changes in education management. The quality of subject-specific education outcomes was provided by regulating the learning process: a unified curriculum, unified syllabi, unified standard textbooks, and unified requirements to the lesson structure.

The above mentioned factors should also include the ideological one, which manifested itself, in particular, in the attitude toward the international experience. A statement in an article published by *Sovetskaya pedagogika* journal in 1973 can be considered typical of that time: “The accelerating scientific progress and the rapid obsolescence of knowledge require that working people of all levels and categories be prepared to the ongoing expansion, improvement and renewal of their knowledge. The same is required by the changes going on in the world and the growing involvement of general public in social and political life. The existing education systems do not prepare for that. Authoritarianism and dogmatism result in presenting knowledge as something unshakeable, complete and applicable unchanged for a lifetime. Such knowledge doesn’t inspire a person for a creative idea,

initiative, or innovation” (no 2, p. 123). The article applies this strong criticism to bourgeois education systems only. It asserts that “there is antiscience in the attempt to Illich and Reimer to attribute social peculiarities and basic features of bourgeois school and education to school and education in any society in general”.

In 1981, *Sovetskaya pedagogika* published an article on the approaches to educational effectiveness used by leading capitalist countries (no 10). It points out that “the United States and Western European countries elaborated new forms of learning process organization, continued modernizing the content of education and the teaching methods, determined new criteria to assess performance of educational institutions, and brought the traditional effectiveness strategies up to date.” Further on, the article talks about the purely class orientation of those measures taken in the era of drastic social transformation, when socialism was growing stronger and proliferating, while the instability of capitalism was becoming ever more obvious.

The closed nature of the education system and the contraposition of the Soviet school experience to international practices constricted the development opportunities of Soviet education. The country had developed a compulsory education system that only allowed some minor changes. The attitude toward the Western European and American schooling experience didn’t begin to change before the end of the Soviet era, with the attempts to identify progressive trends in the development of foreign educational practices [Dzhurinsky 1988].

The transition to universal education for children implied taking measures to make children obey adults’ requirements immediately and unquestionably. The then dominating views on the child and child’s nature tolerated violent methods. Such views began to change in the second half of the 20th century, which was reflected in the adoption of the Declaration of the Rights of the Child (1959) and in the development of humanistic pedagogy ideas. The attitude towards children as participants of the learning process was changing.

By that time, other factors determining the nature of the education system had begun to lose their importance: the demands of post-industrial society were being shaped, the political system was undergoing a transformation, and the skill level of the teaching staff had increased considerably.

Signs of a Soviet schooling crisis started manifesting themselves in the 1970s, during the transition to universal compulsory secondary education. With the development of mass media, TV initially, school was losing its monopoly on general education. Its significance as an institution of general education was gradually decreasing.

The existing education system provided equality of access to education and equal educational opportunities. The level of graduates’ competencies had long been improved by means of extending the period of schooling. However, this resource was exhausted after the transition to universal secondary education.

How and Why the “Hybrid” Education System Appeared

The transformational processes in education gave birth to the so-called “hybrid” system, an “educational Janus” looking into the ideology of duty with one eye and into the ideology of right with the other.

The 1990s witnessed a boost in school diversification. This was a step towards creating a system of diverse schools, in line with the ideology of right. The right to choose an education program was sustained by a pretty broad array of study guide methodologies. Additional conditions for enforcing this right were supposed to be provided by the transition to subject-oriented instruction in high school. The 2012 law On Education in the Russian Federation allowed the use of individualized curricula and seemed to support the ideology of right as well.

In reality, however, diversity in education programs received no further development; instead, the unification trend began to prevail. The differences between schools are determined more and more often by their position in the ranking showing their performance in implementing almost identical education programs. The law allows the development of customized programs adjusted to the specific features of the learning environment and student population, but in practice most curricula copy the sample ones. The orientation to unification is also confirmed by the attempts to bring the “unified textbook” back to life.

Implementation of the ideology of duty in the Soviet school was associated with strict regulation of school performance indicators. It would seem that the pressure of administrative institutions on schools designed to obtain the desired indicators has weakened over the last 25 years, as there is no real need for it anymore. On the one hand, performance indicators and the like have become familiar reference points for schools; on the other, schools whose enrolment depends on parental choice cannot ignore parental expectations about education outcomes. Yet, schools are still responsible for providing high USE¹ results and producing graduates on a regular basis.

Coercive measures in education are hampered by inertia, while their efficiency is on a downward trend: mass grade repetition is long gone, and very few students fear earning unsatisfactory academic quarter final grades, although school still has ways of poisoning a child’s life. Independently assessed final examinations become an ever more significant factor affecting student attitude towards the learning process. Some prerequisites are now created to get students and their parents more interested in education outcomes than teachers.

Understanding of education outcomes is most often restricted to subject-specific performance. Meanwhile, the possibility of compensating underachievement in a specific subject by other achievements in the same domain is virtually out of the question. As for meta-subject and personalized outcomes of learning, opinions vary: some teach-

¹ Unified State Exam

ers see them as another pedagogical slogan; some acknowledge their importance but pay little attention to them, because these outcomes are not analyzed or assessed in any way; and others regard them as the ultimate goal of teaching.

The school preserves its orientation towards familiar academic performance indicators, which mostly matter for students from the perspective of further education, while having little relevance to the development of a life philosophy and skills important for their personal fulfillment.

There are signs that the professional community is gradually recognizing the need to assess education outcomes on the basis of individual advancement of students in various learning activities instead of using the degree of approximation to the accepted standard. Yet, the orientation towards the familiar educational effectiveness indicators is still prevailing, as the actual responsibility for their achievement is imposed overwhelmingly (and often exclusively) at school.

The subject-class-and-lesson system is preserved as well. The subject link of this system has undergone some changes: along with traditional academic subjects, schools have begun to offer optional courses that cannot be always attributed to the basics of a specific science. Other formats of learning are emerging, apart from the lesson; conventional classes coexist sometimes with other student groupings. These “deviations” prove the retreat from comprehensive regulation in education; however, the orientation towards unification and academic performance is still prevailing.

Schools continue to focus on achieving the required outcomes, which are controlled by the state final examination system. Thereby, students gain experience of fulfilling others’ prescriptions. At the same time, just as in the Soviet era, efforts are made to compensate for the strictly mandatory nature of classes by creating an uncontrolled space in terms of out-of-school activities. However, attempts to regulate even this sphere have been observed over the last years, as the new education standards have been introduced. Such attempts are not designed to consider children’s interests or strengthen the ties between classroom and out-of-school learning; they are induced by the requirement to submit statements of application of funds allocated for out-of-class learning activities. As a result, there is a risk of reduction in time resources that students can use at their sole discretion, including time required for doing homework. In the end, the possibility of education quality deterioration is increased.

In analyzing the effects of transformational processes on the fundamental values of the Russian education system, we can conclude that changes focus on the “right for education”, while preserving the overall orientation towards the “ideology of duty”.

The “hybrid” system owes its existence to the contradictory nature of the transformational processes going on in society as a whole and in education in particular.

The notion of *transformation* is used in sociology to discriminate between “change” and “modernization”. Vladimir Yadov called attention to the fact that “...transformations may have any direction: it can be copying of an image, or moving horizontally with due regard for peculiarities, so to say, or going back to “the good old days” lost due to intrigues of internal and external enemies—all of these changes happening, of course, “for the better”. The trouble is that everyone understands “the better” in their own way” [Yadov 2006: 9].

As Yadov emphasized, the differences in social changes are determined by the existence of two types of matrixes of social being: western and eastern. These historically developed matrixes each reproduce their own type of social attributes, which are strikingly different in western and eastern countries. In an eastern-type matrix, social life is dominated by the state, which represents a rigid hierarchical structure. Non-governmental civil institutions are developed extremely poorly. Contrastingly, horizontal ties within the civil society are the shaping factor of western-type matrixes.

The idea of two matrixes seeking to reproduce specific types of social institutions can be applied to explain the transformational processes in school education. Two “sociocultural matrixes” defining the fundamental values of education systems manifested themselves most conspicuously in discussions of the late 1980s–early 1990s. The matrixes were reflected in two conceptions developed at the very end of the Soviet epoch. They were published by *Uchitelskaya gazeta* on October 18, 1988, shortly before the All-Union Congress of People’s Education Workers. One of the conceptions was elaborated by the working group of the Academy of Pedagogical Sciences of the Soviet Union (APS), and the other by the Basic School Interim Research and Development Team (IRDT) headed by Eduard Dneprov, Artur Petrovsky, and Vasily Davydov. Both teams proceeded from the need for an in-depth transformation of the secondary education system, justifying this need in different ways though.

The first conception rested upon the demands of the state and the need to ensure a reformation of Soviet society. It argued that “young people should understand the policies of the Communist Party and the Soviet State <...> They should be creatively productive, business-oriented, socially enterprising and proactive, with a thrifty attitude to business, and willing to accept sole responsibility for the future of the country and socialism.” The other conception blamed the pre-crisis of school on its one-legged orientation: the school had begun to work solely for the benefit of the state: “The nationalization of school transformed it into a closed-type, nearly secure facility. The child’s interests and society’s needs have been gradually forced out of the school.”

The conceptions also differed in their approaches to defining the goals of school education. The APS conception was premised on prescriptive expectations: what a personality should be like from the per-

spective of a specific ideology. The IRDT conception relied on reality: actual existing problems and the opportunities available at the school.

The gap between the two approaches could be observed in the attitude toward universal compulsory secondary education. *Izvestiya* newspaper published two articles touching upon the issue on December 15, 1988. One of them read: “The APS conception agrees with the publications whose authors, while declaring the universal right for education, would like to cancel the universality of secondary education by releasing sixteen- and seventeen-year-olds from the responsibility of obtaining such comprehensive secondary education and their parents from the responsibility of helping their children complete such education. Will the society win in this case? Won’t be students and their parents misguided by such an apocryphally democratic and blatantly simplified approach to the universal nature of secondary education?” The opponents replied: “Life has demonstrated unmistakably what coerced learning can lead to. Haven’t we had enough rough time with compulsoriness that changed into coercion?! Wasn’t it this compulsoriness that “allowed for” the depreciation of school certificates, the drop in education quality, the obsession with rankings, and large-scale false reporting that destroyed the moral image of the school?”

Both attitudes were represented in the All-Union Congress of Education Workers and later in the practical measures taken to develop the education system. Fundamentally, the two approaches differed in being oriented toward interests of different education participants—hence, education systems with different “centers of gravity”, one state-centered and the other child-centered. The interests of the state and children can not be defined as opposite, yet they may be conflicting.

The approaches described above are represented in the Russian educational community even now, almost 30 years after the discussions were analyzed. Moreover, they sometimes combine most surprisingly in everyday teaching practices, ultimately maintaining the orientation towards prescriptive expectations as the key characteristic of the compulsory education system.

It was not only about the processes going on in the social macrosystem. It was also about the teacher-centered education system that began to replace the state-centered one in the 1990s and focused not so much on prescriptive expectations as on what was feasible given the actual resources of an educational institution. In some cases, this orientation resulted in a boost of creative teaching methods, in others it only increased teachers’ abuse of power and nostalgia for the Soviet school.

How Education Quality Is Changing

The school education system has undergone many more changes over the past quarter of a century than over the last 25 years of the Soviet era. Can it be said without prejudice that these changes have improved education quality a lot?

The public is convinced that education quality has decreased: 46% of Russians believe that the quality of school education is getting worse, and 56% conceive that they obtained a better education than their children are offered. Such are the results of a study conducted by the Public Opinion Foundation².

Fifty years ago, education was usually understood as the process and outcome of retaining systematized knowledge, competencies and skills³. This perspective of education goals can often be found today as well. In-depth, comprehensive and durable knowledge is the indicator of education quality in terms of this approach.

The value of education is understood differently within the competency-based approach that has become widespread over the last few decades. Education can be defined as a specifically organized process where a child develops an ability to independently solve problems of social and personal importance in various domains by learning social experience, of which individual experience is an integral part. Under this approach, education quality is primarily indicated by the level of education achieved by students that allows for pursuing a graduate education, socialization, self-cognition and self-determination.

A knowledge-oriented approach to school education quality assessment prevails within public opinion, as proved, in particular, by parent surveys. USE testing and assessment materials are designed first of all to identify subject-specific performance, i. e. skills and competencies in specific disciplines.

USE results allow for the conclusion that there have been no signs of any considerable improvement of knowledge indicators of education outcomes: the average scores were higher in 2016 than in 2013 in some of the subjects and lower in others. Improvements in the USE results can be explained by certain changes in the school education system to some extent only. Rather, they are explained by an increased amount of time spent by students in order to achieve the desired outcomes (tutor training, pre-entry courses, etc.). If the enhancement of education outcomes is primarily associated with increased student workload, it can hardly be regarded as an indicator of education quality.

Positive changes are observed in PISA results. In 2015, the average performance improved by 36 points in reading literacy (as compared to 2009), 26 points in mathematical literacy (as compared to 2003), and 8 points in scientific literacy (as compared to 2006). The indicators achieved are slightly higher or lower than the average OECD results, yet Russia is still falling behind the top-ranking countries. Changes in PISA outcomes reflect the inconsistency of the processes

² Ogonek, no 38 (2016), p. 7.

³ Sovetskaya entsiklopediya(1966) *Pedagogicheskaya entsiklopediya* [Pedagogical Encyclopedia], Moscow, vol. 3, p. 141.

taking place in education: the system-activity approach ideas are penetrating teaching practices, but the transformation is taking too long.

Some obvious downfalls are also observed, as compared to the Soviet school. The universal education system is based on using adapted texts in the learning process, but it should also provide experience of working with authentic cultural phenomena. In school practice, these include mainly literary works, but many believe that today's school children read less than previous generations.

Society is undergoing changes that impose new education quality requirements: the proportion of mental labor is growing, new forms of business organization are emerging, political life is being liberalized, and the choice of leisure activities is widening. However, there is still no convincing evidence that the education system is able to respond to the existing challenges.

Changes in education outcomes will be enabled by changes in the quality of the learning process, which depends largely on the students' attitude towards this process. The proportion of students appreciating school as an educational institution is falling, according to Semyon Vershlovsky's findings. When assessing the significance of school education, 67% of respondents agreed that school had given them knowledge in 2009, as compared to 82% in 2001 [Vershlovsky, Matyushkina 2011; Vershlovsky 2010]. Academic honesty is an important indicator of attitude to learning. A number of studies in higher education have been devoted to academic fraud in recent years, in particular to plagiarism and cheating [Maloshonok 2016; Shmeleva 2016]. Obviously, universities enroll yesterday's school students who already have some experience in plagiarizing and cheating. This practice is established and consolidated in a situation where performance indicators matter more than practical outcomes. The school itself may sometimes encourage this practice of demonstrating the should-be indicators of its performance. Therefore, there is every reason to believe that the existing "hybrid" system doesn't have enough potential to solve education quality problems in the rapidly changing society.

What an Alternative Education System Could Be Like

Qualitative changes should happen to the education system to enable it to solve the problem of education quality in the changing society. The need for such changes is justified in the article *Education as a Right and Obligation* [Lebedev 2005]: a new type of education quality has to be achieved to ensure the transition from literate to educated society; theoretical and methodological knowledge on the ways of increasing the quality of learning has been accumulated; transition to customized learning is under way, and conditions have been created for the selection of educational institutions and education programs by students and their families.

The basic characteristics of an education system alternative to the compulsory one have been outlined over the last decade. They

have been mentioned in publications by Alexander Asmolov, Anatoly Kasprzhak, Katerina Polivanova, Isaak Froumin and other education researchers [Asmolov 2012; Kasprzhak, Bysik 2014; Polivanova 2006] as well as in expert reports [Civic Chamber of the Russian Federation 2007; Volkov et al. 2008].

Skolkovo educational complex projects are a good example of designing a specific education system based on new didactic and management approaches. The projects suggest preserving the subject-class-and-lesson system at the existing stage of education development, while implying substantial changes in each of the elements of this didactic system. These projects underline that the content of education is not specific subjects but the mode of action taught with the help of those subjects, i. e. children learn not so much a subject itself but also the thinking, communication and behavioral patterns demonstrated by the teacher, as well as by the students themselves. The projects also elaborate the idea of shaping a package of education programs (meta-subject, subject-specific and individualized). The authors believe that any syllabus should be constructed not only as a program for learning subject content but also as a program for personal growth, development of necessary life skills, and gaining self-instruction experience. The projects promote the idea of using various internal class structures at each stage of school education as well as adding the format of mixed-age mobile teams to the class-based system. They suggest refusing linear time tables and using diverse forms of learning organization instead (mixed-aged lessons, adult/child design seminars, subject immersion, academic workshops, tutor training, etc.). These are only some of the project suggestions presented in the Skolkovo Schools Competition.

The conception of the new school education system is articulated quite clearly in the pedagogical manifesto *Gumanisticheskaya pedagogika: XXI v.* [Humanistic Pedagogy: The 21st Century] written by Alexander Adamsky, Alexander Arkhangelsky, Vladimir Sobkin, Igor Remorenko, Tatyana Kovaleva, and other professionals famous within the community. These and other publications all contain answers to the question: whom should school teach what, how, and why?

Radically different answers can be given to this question, as proved by school education practices and educational project development experience.

Two options are offered for the question “Whom to teach?”: (i) everyone who is obliged to attend school; and (ii) everyone who has the right to obtain a school education. Education is regarded as an obligation in the former case and as a right in the latter. Obligation suggests orientation towards the state’s interests, while right implies the focus on students, thus providing the opportunity of choosing between educational institutions and education programs.

The answer to the question “How to teach?” has to do with the learning process organization and the choice of teaching methods.

Learning has traditionally been organized within the framework of the subject-class-and-lesson system. At the same time, however, there have been numerous attempts to renounce this system or at least to retreat from it in some aspects.

Meanwhile, there can be different degrees of learning process regulation within such a system: prescriptions apply to either (i) all the learning process components and outcomes or (ii) the learning environment required for providing high academic achievements alone. In the first case, schools face the academic performance requirement, which means that different children should digest the same curriculum within the same period of time. In the second case, focus is placed on the requirement to create conditions for the individual progress of all children within the same academic period. Such progress may take the form of objectively different achievements which, nevertheless, have the same value in terms of the development of a student's potential. Thus, schools search for either coercive teaching methods, as in the first case, or methods to promote cognitive thinking, as in the second.

When the learning process is comprehensively regulated, it becomes unified; refusal from comprehensive regulation means recognizing the value of diversity and the multivariance in education.

Answers to the question "What to teach?" can also vary. Two alternative options can be identified, proceeding from the goal-oriented nature of education: (i) achieving required outcomes; and (ii) fulfilling one's educational opportunities. In terms of everyday teaching practices, it means coaching students for USE tests in the first case and helping them see their opportunities and ways of fulfilling them in the second one.

Possible answers to the question "Why teach?" are rather unambiguous: (i) for the sake of the future; and (ii) for the sake of improving the quality of life "here and now".

The differences in the answers to these questions are explained by the differences in the fundamental values of the education systems. In one case, education is treated mainly as a tool for solving problems important for the state, while in the other as the ultimate value, a factor of personality's potential development, and an integral component of lifestyle. Therefore, the education system is centered around the ideology of duty in the first case and around the ideology of right in the second one.

In constructing an alternative model of the education system, we can use the higher education modernization experience based on the principles of liberal education. The fourth issue of *Voprosy obrazovaniya/Educational Studies Moscow* journal in 2015 was largely devoted to this experience. The liberal education model can be implemented as a system alternative to compulsory education.

An analysis of the practices described in publications identifies the following liberal education system characteristics applicable in the school context:

- Development of the attitude towards education as an important factor in improving the quality of life in students by following up on and satisfying their educational demands;
- The broad scope of general education implying equivalence of all domains along with identification of three components—humanities, science and engineering—in each domain;
- Individualized educational trajectories based on the independent choice of courses within the selected domains, the level of immersion in compulsory subjects, sources of information and problems to solve, interim assessment methods, supplementary education and self-education programs (provided that students have enough free time to make all these choices);
- The use of interactive teaching strategies, which imply a lot of independent work (written and oral statements, research, critical analysis of one's own texts, etc.), and workshops on independent learning techniques;
- The interdisciplinary nature of curriculum, which includes not only subject-centered but also meta-subject programs put into practice by combining different subjects and building strong ties between learning and extracurricular activities;
- Students developing higher personal responsibility for the choice of a customized education program and its outcomes step by step (as they are getting older); changes in the area of school responsibility as well: focus on creating conditions necessary for effective learning;
- Integration of the system of curators to support students in their independent learning.

Naturally, the enumerated characteristics have to be tailored for each specific stage of school education. Yet, the factors shaping the education system remain the same for every stage: attitude toward education as the right of students to select an individual trajectory for developing their personal potential by educational means; school responsibility for creating conditions necessary for making and fulfilling this choice; and responsibility of students for using the provided conditions to develop their personal potential. While the compulsory education system is oriented at prescriptive expectations, individual progress is the fundamental focus of liberal education.

A change in the system-forming factors and, consequently, in the key characteristics of the education system will result in creating a value environment that will become the main driver for achieving the new type of education quality.

Such a value environment appreciates the following:

- Independence, not prompt obedience;
- Thirst for the truth, not being able to give “correct answers”;
- Individuality, not uniformity;

- Teamwork skills, but not susceptibility to group influence;
- Willingness to assume personal responsibility in a risky situation instead of leaving the decision to others;
- The ability to encourage learning, not the ability to teach.

The list of values may differ from the above, but the design of any education system should inevitably include a description of the value environment to be constructed.

Having the idea of an alternative education system in mind is an indispensable yet insufficient condition for a qualitative change in education. Real opportunities for such change will appear if it receives support from teachers, students, school administrators, and the public. The evolution of attitude toward education and cross-actor educational relationships, which act as a system-forming factor, is a sophisticated process, controlled and unpredictable at the same time. Educational relationships are affected by managerial decisions, but the latter, in turn, are affected by the attitude of education system players.

National education standards could contribute a lot to changing the situation in the context of the “hybrid” education system.

Where the Point of Bifurcation Will Be

Third-generation education standards, which haven't yet been presented, at least in the form of the first drafts, will inevitably determine the vector of further transformation in school education—whether preserving and improving the existing compulsory education system or creating the conditions for transition to an alternative one.

Based on the possible functions and role of education standards, we will try to determine the specific characteristics of second-generation standards and the distinctive features of the third-generation ones [Lebedev 2011].

Federal state education standards for primary, middle and secondary school contain the chapter called *Requirements to Education Outcomes Obtained Within the Basic Education Program*, i. e. they standardize academic performance indicators. The complete secondary education standard provides a detailed description of expected personal achievements (15 items), meta-subject performance (9 items), and subject-specific education outcomes (222 items in total). The “Portrait of a Graduate” (11 items) should also be added to this list. The same detailed elaboration of requirements to education outcomes can be observed in primary and middle education standards.

The standards do not specify the proportion of students able to achieve results conforming to all the requirements. They say nothing about how these requirements could be used to assess a specific situation, e. g. to assess the effectiveness of the whole education system, its regional or municipal levels, or the performance of individual

schools. Obviously, such requirements can not be applied to individual students in final examinations. Otherwise, most graduates would lose their right to a certificate due to at least one unsatisfied requirement (e. g. due to the lack of competency in the main types of professional military activities, item 11 in the Safety and Health chapter of the secondary education standard).

In addition, there are no regulatory documents to stipulate who should and how they should assess the compliance of real-life education outcomes to the standard requirements. This way, the standards required for education outcomes obtained within basic education programs rather tend to resemble pedagogical slogans in practice.

The extent to which the education program implementation requirements stipulated by the standards should be compulsory remains unclear too. It is not specified who should monitor fulfillment or analyze compliance of real-life conditions to those prescribed, or what the possible effects of noncompliance could be.

Standards can regulate education content as one of their functions. Curriculum structure and content are regulated in great detail (the secondary education standard contains about 60 requirements in regards to the content of basic education programs), while the learning process as such is not regulated too strictly. The standards contain curriculum instructions and assessment requirements; however, they provide no distinct learning process assessment criteria. In the context of the existing management practices, characterized by a high level of bureaucratization, the school often concentrates its efforts on preparing relevant documents to comply with the standard requirements instead of focusing on changes in the learning process.

Second-generation standards mostly regulate the process of goal setting, since performance requirements are in fact articulated as the goals of education. The extent to which the goal achievement process is regulated gives enough freedom for creative methodology in the development of programs and the choice of teaching techniques. The same can be said about the regulation of the system designed to assess the achievement of expected education outcomes.

It would seem that the focus on requirements and the low extent to which the outcome achievement process is regulated open the door to pedagogical innovations designed to improve the quality of the learning process. In reality, however, creative pedagogy opportunities are used rarely and by few teachers. It is not only about the qualification level or workload, it is also about how education outcomes are regulated. If such regulation has no significant practical relevance due to the vague status of outcome requirements, it will not affect the learning process in any way: outcomes required in practice can be achieved without much change. The opportunity for creative pedagogy exists but can be easily omitted.

If we approach third-generation education standards as a means of regulating the transition from compulsory education to an alterna-

tive education system, we can suggest a few hypotheses on the prerequisites required for the standards to fulfill this function.

The underlying hypothesis consists of the following: national education standards can become a means of regulating the transition from compulsory education to an alternative education system if the scope of their regulation is restricted to management problems that should be solved at the level of individual educational institutions.

This hypothesis is customized for particular chapters of the education standards.

Hypothesis 1. Education standards can serve as a tool for change management in education if:

- They inherently set the goal of such change;
- They determine the importance of change for every category of education system players;
- They determine the importance of compliance with the standards for educational institutions.

The first chapter of the existing standards describes the desired social effects of standard implementation, the expected personal characteristics of graduates, and the types of management and methodological activities to carry out on the basis of the standards.

For education system players, transition to an alternative system will be associated with higher decision-making autonomy in the context of a broader choice of options, and at the same time with greater responsibility for their own decisions. Access to a wider array of opportunities should be provided for the development and implementation of authentic education programs by school administrators, syllabi by teachers, and individualized educational trajectories by families. Otherwise speaking, standards should allow for unorthodoxy and promote diversity in education.

To change the status of standards and increase their importance for educational institutions, it would make sense to change the very first item in the existing standards. It says that the standard represents a set of requirements to be fulfilled by nationally accredited educational institutions. It would be more important to emphasize that national accreditation is available for educational institutions complying with all the standards.

The proposed changes may develop a different attitude toward standards, initially on the part of school administrators and teachers, who would treat them not as prescriptions they should respond to but as new opportunities for solving the existing problems in education.

Hypothesis 2. Educational effectiveness can be increased if education standards:

- Confine themselves to indicating the level of education to be achieved at the stage of primary, middle or secondary education instead of giving a detailed description of required education outcomes;
- Stipulate that every educational institution determines independently the education outcomes, specifying and exceeding the standard requirements, that it guarantees to achieve and indicate the relevant assessment methods.

The necessary level of education in primary school may be identified as common literacy, which is indicated by the retention of universal learning activities. This level should guarantee the opportunity of successful learning in middle school, which, in turn, should guarantee achievement of the level of functional literacy sufficient to continue education and solve socialization problems.

Complete secondary education should ensure achievement of general cultural and pre-professional competencies at the level sufficient for solving self-identification problems.

Of course, levels of education defined in such a way can easily be subjected to criticism. Therefore, in this phase of discussing the conception of third-generation education standards, it would be essential to develop the fundamental understanding of the main outcomes to be achieved by students at each specific stage of school education using the opportunities acquired at the relevant stage.

If standards stipulate the minimum requirements to education outcomes, complete fulfillment of which entitles a student to a certificate of the relevant level of education, each school will face the necessity to declare the level of education (including supplementary) it can provide beyond the minimum standard. Obligations of this type will only make sense if the standards require that schools specify in their education programs who is going to assess education outcomes, and how.

Such an approach to defining education outcomes will not be accepted by all schools. However, it will find support from the most advanced schools or those seeking to achieve this status.

Hypothesis 3. The quality of the learning process in school can be improved if standards:

- Refrain from elaborating detailed requirements to the structure and content of programs that make up the overall education program of an educational institution (universal learning activity development program, character-building and socialization program, syllabi for specific subjects and extracurricular activities, and correctional program) and confine themselves to defining the problems to be solved by such programs;

- Set individualized education program development and implementation goals, for the achievement of which schools will be held responsible;
- Require that individual characteristics of education programs be justified by the specific nature of the student population, learning environment, unique school traditions, etc.

In this case, the focus of education management will shift from preparing documents showing compliance with the standard requirements to tailoring the learning process to fit into the existing socio-cultural context.

Education standards must provide not uniformity but rather diversity of schools, so that the latter can use their potential and individual opportunities more effectively. Education programs that serve as schools' internal standards must provide for the pluralism of individual educational trajectories, including various forms of individual progress in specific subjects. It is highly probable that such orientation will require schools to develop and implement customized education programs for specific classes, which will dramatically increase the role of class teachers in the organization of the learning process. This will necessitate the creation of the institution of "mobile class teachers" capable of performing tutoring functions.

Hypothesis 4. The significance of education standards for the provision of conditions necessary to achieve the required quality of the learning process can be increased if the standards:

- Specify which group of education system players these conditions are created for;
- Determine who will be responsible for the provision of said conditions;
- Require that schools specify in their education programs the conditions beyond the required minimum that they will guarantee to provide.

In this case, instead of classifying the conditions by type, *Requirements to Education Outcomes Obtained Within the Basic Education Program* will use "target-based classification": conditions for students; conditions for teaching staff; conditions for students' parents; and common conditions (relating to all education system players).

Some conditions are already required from all schools without exception (although they are not always absolutely categorical): fire safety requirements, health and hygiene requirements, requirements for the provision of students with study materials, etc. In practice, many conditions that play an essential role for education system players differ from school to school. Such differences will always exist. The challenge consists not only in creating conditions required to provide

a normal learning process but also in promoting the modernization of those conditions by schools and education authorities. The education program of each individual school must indicate the conditions that the school can provide beyond the required minimum.

* * *

A change in the national education standards is an insufficient yet indispensable prerequisite for transition to an alternative education system. The introduction of new standards implying a higher level of school autonomy in constructing education programs will make the school more open to cooperation with parents. The need for synergy with science, typical of the first half of the 1990s, will increase again. All of this will result in a qualitative change of the school's learning environment and fundamental values.

Analysis of the school education system's potential in the Soviet and post-Soviet periods allows us to conclude not only that refusal of compulsory education is inevitable but also that transition to an alternative education system is possible.

This possibility has to be used to achieve a new quality of education conforming to the challenges of the 21st century. Considerable changes in education quality are not impossible, provided that quality management methods change and the techniques that used to be effective at an earlier stage are abandoned. International practice confirms this conclusion [Barber, Mourshed2008].

Comprehensive regulation of all the learning process components was the main quality management method used at the stage of establishing the system of universal school education to provide accessibility of the latter. The approach began to lose its effectiveness when the social problem of providing access to education began turning into a pedagogical one.

Orientation toward uniformity was losing its significance quickly in the context of universal secondary education. Education quality management based on the diversification of educational institutions led to the development of discrepant trends in education, giving birth to the "hybrid" education system.

Under the existing conditions, the role of the system-forming factor is assumed by the individualization of the learning process, which implies increasing the degree of autonomy and responsibility in every group of education system players: students—in the choice and implementation of individual educational trajectories, and teachers—in the individualization of the ways to prepare students to make this choice.

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Seymour Papert and Us. Constructionism as the Educational Philosophy of the 21st Century

The History of the Concept, Approaches to Defining, and Measurement in PISA Questionnaire

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Abstract. Seymour Papert—a major philosopher of education, a great educator of modern age, and the father of constructionism—passed away in summer 2016. The floor and screen turtles he added to the Logo programming language provided visualization and objectification of the processes, as well as conciseness of programming. As a result, Logo developed into a unique environment that millions of children in doz-

ens of countries use to learn algorithmic (or computational) thinking. Professor Seymour Papert visited the Soviet Union and Russia a number of times. He played a key role in the establishment of the post-Soviet school's educational philosophy. The article describes a number of crucial ideas and events associated with the development of Papert's education philosophy, the implementation of his educational conception in Russia, his visits to Russia, and his meetings with Russian educators, which were first of all attended by the author.

Keywords: philosophy of education, constructionism, mathematics, Logo, international cooperation in education.

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