ISSN 1814-9545 (PRINT)
ISSN 2412-4354 (ONLINE)

ВОПРОСЫ ОБРАЗОВАНИЯ

Educational Studies Moscow

2 2021

National Research University Higher School of Economics

Voprosy obrazovaniya / Educational Studies Moscow
No 2, 2021

established in 2004, is an academic journal published quarterly by the Higher School of Economics (HSE)

ISSN 1814-9545 (Print)
ISSN 2412-4354 (Online)

The mission of the journal is to provide a medium for professional discussion on a wide range of educational issues. The journal publishes original research and perceptive essays from Russian and foreign experts on education, development and policy. "Voprosy obrazovaniya / Educational Studies Moscow" strives for a multidisciplinary approach, covering traditional pedagogy as well as the sociology, economics and philosophy of education.

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All papers submitted for publication in the "Voprosy obrazovaniya / Educational Studies Moscow" journal undergo peer review.
Distributed by subscription and direct order
Address
National Research University Higher School of Economics
20 Myasnitskaya Str., Moscow, Russia 101000
Tel: +7(495)772 95 90 *22037, *22038
E-mail: edu.journal@hse.ru
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National Research University Higher School of Economics

Voprosy obrazovaniya / Educational Studies Moscow

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PRACTICE

HISTORY OF EDUCATION

The Non-Bypass Trajectory, or The Boom in Demand for TVET in Russia

V. A. Maltseva, A. I. Shabalin

Received in December 2020

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Abstract

Since the mid-2010s, Russia has been witnessing a redistribution of student flows between higher education and TVET (Technical and Vocational Education and Training), more and more school leavers applying to TVET institutions. Postsecondary educational choices are closely associated with socioeconomic status of the family, so changes in the patterns of educational transitions may indicate both changes in the education system and shifts in the national socioeconomic system. In available literature, the growing enrollment in TVET is mostly explained by "push" factors repulsing students out of secondary and higher education systems, and by the so-called "bypass maneuver" of accessing college via TVET that is popular among Russian school leavers.

This article attempts to find out whether the demand for TVET is actually increasing, what may stand behind it apart from the factors within the education system, and whether there is a socioeconomic dimension to this change. Research results allow debunking the myth of the TVET sector growing by virtue of using TVET programs as a springboard to college. Demand for vocational educational trajectories is growing beyond the "bypass maneuver"—not only among middle-school graduates, who are at the main fork in educational trajectories, but also among high-school leavers. Changes in the demand for TVET programs has exposed rigidity of the TVET system, which manifests itself in enrollment capacity being unable to satisfy the demand for particular specializations, excessive growth in tuition-based enrollment, and the "invisible" demand from high-school leavers. The increasing popularity of the vocational track results from the mutually reinforcing factors in the education system, negative economic growth, and labor market situation. The most important trigger behind the growing demand for TVET is the shrinkage of household disposable income: coupled with reduced access to higher education, it "pushes" school leavers with low socioeconomic status out of the academic track.

Keywords

bypass maneuver, higher education, postsecondary educational choices, socioeconomic inequality, transit educational trajectory, TVET.

For citing

Maltseva V. A., Shabalin A. I. (2021) Ne-obkhodnoy manevr, ili Bum sprosa na srednee professional'noe obrazovanie v Rossii [The Non-Bypass Trajectory, or The Boom in Demand for TVET in Russia]. *Voprosy obrazovaniya / Educational Studies* Moscow, no 2, pp. 10–42. https://doi.org/10.17323/1814-9545-2021-2-10-42

Vocational school or college? The dilemma seems farfetched, given the persisting high social demand for higher education[1] and the greater returns to college degrees [Melianova et al. 2020]. However, since the mid-2010s Russia has been witnessing a redistribution of student flows between higher education and TVET (Technical and Vocational Education and Training), more and more school leavers applying to TVET institutions. TVET students accounted for over 50% of tertiary enrollment[2] in 2020. The growing popularity of TVET and the shrinkage of the academic track are not only a signal to the education system but also an important indicator of the socioeconomic situation in the country. Postsecondary educational choices are closely associated with the socioeconomic status (SES) of the family [Khavenson, Chirkina 2019; Yastrebov, Kosyakova, Kurakin 2018], and changes in the patterns of educational transitions may indicate a worsening of socioeconomic inequality.

Shifts in the balance of TVET and college enrollment among youth and the growing number of TVET institutions throughout the 2010s have already been addressed in a number of studies [Dudyrev et al. 2019; Konstantinovsky, Popova 2020; Klyachko et al. 2019; Malinovsky, Shibanova 2020]. Experts predict that the proportion of TVET students in tertiary enrollment will continue increasing as high school is growing more selective [Dudyrev, Romanova, Shabalin 2017] and higher education is getting less geographically and economically accessible [Malinovsky, Shibanova 2020]. However, in addition to "push" factors within secondary and higher education, experts also identify external, or "pull" factors, such as changes in the value of college degrees for youth in the context of labor market transformations [Konstantinovsky, Popova 2020].

Other scholars explain the TVET sector expansion by the popularity of the middle school–TVET–college transit trajectory among Russian school students as a less risky path to higher education [Belyakov, Klyachko, Polushkina 2018; Konstantinovsky, Popova 2018]. Thirty percent of Russian TVET graduates go to college. However, the popularity of this transit trajectory does not explain the decline in college enrollment. Debate over the "bypass maneuver" shifts the focus of attention to middle-school leavers' educational choices, although the fork after high school and changes in the choices of graduates from selective high school are of no less importance in this context. High-school leavers choose directly between TVET and college, so socioeconomic factors have a greater impact in this case [Khavenson, Chirkina 2018].

[1] According to a national survey of Russian citizens aged 18 or over conducted by Public Opinion Foundation (FOM) in July 2020: https://fom.ru/Nauka-i-obrazovanie/14436

[2] Tertiary education embraces programs in postsecondary education: TVET (except skilled-worker programs) and higher education.

Translated from Russian by I. Zhuchkova.

If educational choices after high school are not considered, it will remain unclear whether there is a "real", non-transit vocational track. Is it only "push" factors within the secondary and higher education systems that stand behind the growing popularity of TVET among Russian youth? The growing demand for TVET programs can be a response to the worsening economic situation and the decreasing access to higher education as well as an indicator of young people' trust in the vocational track and changes in their study and career trajectory preferences. This article provides no exhaustive explanation of the observed growth in the popularity of TVET programs among Russian school leavers, yet it seeks to add to the existing explanations by responding to the following questions:

1. Have there been significant changes in school leavers' demand for TVET programs? Is there a real increase in the interest for the vocational track? How is the TVET system responding to the growing enrollment?
2. What can stand behind the changing demand for TVET among youth apart from the "push" factors within the secondary and higher education systems? Is there a socioeconomic dimension to the redistribution of student flows between TVET institutions and colleges?

School students' demand for different educational tracks is analyzed using the statistics on the number of applicants and admitted students[3] obtained from Federal Statistical Monitoring Forms SPO-1 and VPO-1. Admissions statistics are restricted to candidates applying immediately (the same year) after completing middle school (nine grades) and high school (eleven grades), which is especially important when analyzing the TVET sector with its highly heterogeneous student composition.

The article consists of six parts. Part one presents a review of the academic discourse on postsecondary educational choices. Part two describes the expansion of the TVET sector in Russia and the growing youth participation in TVET during the 2010s. Part three examines the growing popularity of TVET by analyzing the flows of candidates — recent middle and high-school graduates. Part four offers analysis of the TVET system's response to the increasing enrollment and the structural changes in school leavers' demand. Part five investigates the reasons for the increased popularity of the vocational track through the prism of socioeconomic factors. The final, sixth part of the article looks into the prospects for TVET in the face of new challenges.

[3] While the number of applications to colleges is regulated and varies from year to year, it is not limited in the TVET system. For this reason, the number of applicants specified in Federal Statistical Monitoring Forms SPO-1 can be treated as an adequate indicator of demand.

1. Review of Literature on the Motivations for Choosing the Vocational Track

Education is a key mechanism for social mobility, so research on postsecondary educational choices constitutes a significant part of the socioeconomic inequality discourse [Chirkina 2018]. The reasons for, and the context of, choosing the academic (high school–college) or vocational (TVET institution) track are often discussed within the theoretical frameworks of maximally maintained inequality [Raftery, Hout 1993] and effectively maintained inequality [Lucas 2001]. The choice of a postsecondary educational trajectory depends not only on academic achievement but also on family resources, motivations, and values. Family socioeconomic status (SES) can serve as an integrated indicator of postsecondary educational trajectory. SES is understood as parents' level of educational attainment, income, and occupation. According to the longitudinal panel study Trajectories in Education and Careers (TrEC), children of college-educated parents account for 65.2% of Russian school leavers choosing the academic track, for 42.1% of those preferring the middle school–TVET–college transit trajectory, and only for 25% of those opting for the vocational track [Yastrebov, Kosyakova, Kurakin 2018]. TVET is believed to be a compelled trajectory followed by the least socioeconomically advantaged social groups [Alexandrov, Tenisheva, Savelyeva 2015; Konstantinovsky, Popova 2018].

Russia-based empirical studies [Khavenson, Chirkina 2018; 2019; Bessudnova, Malik 2016; Popov, Tyumeneva, Larina 2013] show that the choice of the vocational track by middle-school graduates is explained by the primary effects of socioeconomic stratification [Boudon 1974], i. e. by the academic achievement that is largely mediated by family SES. Meanwhile, the transit trajectory can be an option for high-SES school students who are not academically successful enough: Russia-based studies demonstrate that this trajectory is often chosen by students from high-SES families as a lower-risk strategy of accessing college [Yastrebov, Kosyakova, Kurakin 2018].

The decisive role in high-school graduates' educational choices belongs to secondary effects of socioeconomic stratification, i. e. family SES itself [Khavenson, Chirkina 2018]. Secondary effects imply a direct influence of family SES on the choice of trajectory [Boudon 1974]. College education is highly valued in affluent families with well-educated parents, whose children internalize the family values and develop a motivation for obtaining a college degree. This way, family socioeconomic characteristics directly affect educational choices of high-school graduates.

SES is also indicated indirectly by whether the family lives in a rural or urban area. Urban high-school graduates are more likely to go to college as they have better physical access to universities, while moving from a rural area is fraught with extra costs and challenges [Konstantinovsky et al. 2006; Kondratenko, Kiryushina, Bogdanov 2020]. Selective colleges are unavailable in one third of Russia's regions, which makes it considerably more difficult for school leavers to achieve their academic potential [Gromov et al. 2016]. However, this

aspect of college distribution in the country may play no significant role for students choosing the vocational track, i. e. children from relatively low-SES families who are less likely to enter selective colleges [Prakhov, Yudkevich 2012].

Some scholars believe that personal motivations for choosing TVET have been changing as well: from compelled to rational choice [Konstantinovsky, Popova 2018]. If school leavers of the 2000s were motivated predominantly by the need to enter the labor market as soon as possible, many TVET students of the 2010s made their choice out of interest for the selected profession as well as financial necessity. Remarkably, motivations of students enrolled in mid-level professional programs (MLPP) and college programs are very similar, whereas students in skilled-worker programs (SWP) have different priorities: easiness of getting a job and decent wages [Ibid.]. However, opposing the compelled and rational choices in educational decisions appears to be unjustified. It follows from rational action theory [Goldthorpe 1996] that, even though choices are made rationally and with due regard to probable costs and benefits, they are always made in specific socioeconomic contexts. Therefore, a rational and informed choice of the vocational track can still be compelled by socioeconomic status.

Sociological surveys show that the main reasons for choosing TVET are "earlier access to the labor market and lack of money for college" [Klyachko 2019]. Significant generation gaps are observed: lack of money for college as the main motivation for choosing the vocational track is more significant for students aged 23–29 (26.6% of the sample) than for those aged 41–46 (17.9%). A greater significance of high school selectivity for the younger generation cannot be disregarded either: 9.8% of the older age group were motivated by the desire to avoid high school, as compared to 15.9% of the respondents aged 23–29. It follows from the above that the financial factor has become key in making postsecondary educational choices. However, the problem of the lack of money for college education is much less acute in Moscow than in other regions. Data from sociological surveys also demonstrates the role of SES, family income, and place of residence as important factors when choosing a postsecondary educational trajectory.

Our search for the reasons behind the increasing popularity of TVET among Russian youth during the 2010s will be premised on the fundamental principles of the theories described above. First of all, household disposable income will be used as an indicator of the socioeconomic context of educational choices. The proportion of children with college-educated parents is growing: in 2019, 32.8% of Russians aged 35–49 had a college degree,[4] as compared to 27.7% in 2010.[5] Thus, par-

[4] Based on the representative sample from the 28th round of the Russia Longitudinal Monitoring Survey — Higher School of Economics (RMLS-HSE) (2019).

[5] Based on the Russian Census 2010: https://rosstat.gov.ru/bgd/regl/b12_13/isswww.exe/stg/d2/07–03.htm

ents' educational attainment as a factor of postsecondary educational choices may gradually lose its strength as more and more people who studied during the boom of higher education in the 2000s become parents. Secondly, the logic of rational choice will be analyzed within the framework of rational action theory by assessing the balance between the costs and probable benefits for school leavers and their families.

2. TVET in the 2010s: Growing Enrollments and Participation Rates

TVET is an extremely heterogeneous educational sector which includes programs ranging from ISCED (International Standard Classification of Education) level 3 to ISCED level 5,[6] from secondary education for middle-school graduates to tertiary non-university professional education, from worker training[7] to hi-tech and creative professional training. TVET programs are pursued by recent middle- and high-school graduates as well as people who completed middle or high school some time ago and those who already have a TVET diploma in another field or even a college degree. However, the core of TVET enrollment is school leavers, who accounted for 76% (850,000) of all admitted candidates in 2020.

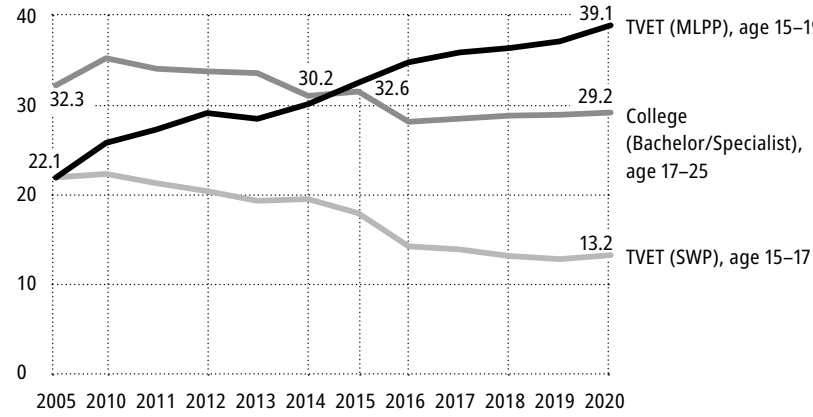
TVET remains the most popular type of professional education among adult population in Russia. According to the 2015 microcensus, nearly 45% of Russians aged 25–64 had TVET diplomas, while college degree holders accounted for only 30.4% of the same age group — the popular myth about universal higher education in Russia has already been debunked in earlier studies [Bessudnov, Kurakin, Malik 2017]. In a younger age group (25–34), college degrees were held by 40.5%, which was probably the outcome of massification of higher education that had swept through the 2000s [Bondarenko et al. 2020]. However, a change of trend occurred in the 2010s, and now youth participation in higher education is permanently reducing amid the growing MLPP participation rates (Figure 1). The tipping point was reached in 2015, when participation in MLPP exceeded participation in higher education.

The redistribution of youth flows between TVET and higher education is vividly reflected in admissions statistics. Amid the stagnant enrollment in Bachelor's and Specialist's degree programs, enrollment in MLPP is steadily growing (Figure 2). TVET students already account for over half of all tertiary admissions. In 2020, the number of students admitted to MLPP alone exceeded the number of students admitted

[6] Skilled-worker programs are classified as ISCED level 3–4 and are not included in tertiary education. Mid-level professional programs are classified as ISCED level 3–5, depending on duration (for middle- or high-school graduates) and specific characteristics.

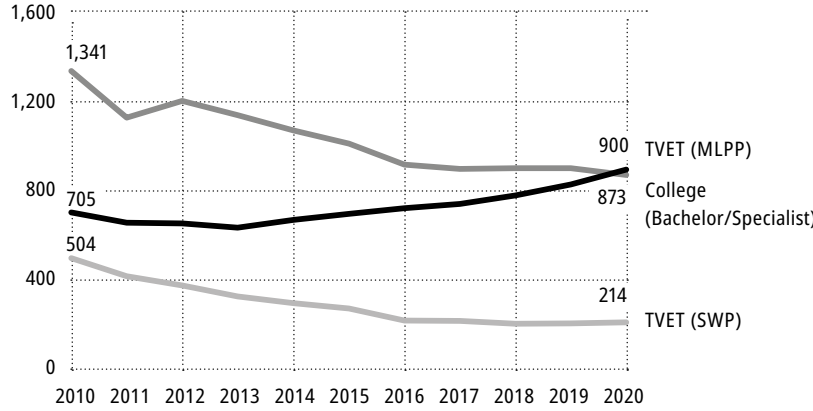
[7] Primary vocational education (PVE) and secondary vocational education (SVE) were merged into TVET by Article 108 of Federal Law No. 273-FZ "On Education in the Russian Federation" of December 29, 2012. Former PVE programs became skilled-worker programs, and former SVE programs became mid-level professional programs.

Figure 1. **Youth participation in TVET programs**, % of relevant age cohort.



Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms SPO-1 and VPO-1 and Federal State Statistics Service (Rosstat) demographics for the relevant years.

Figure 2. **The number of students admitted to college and TVET programs**, thousands.



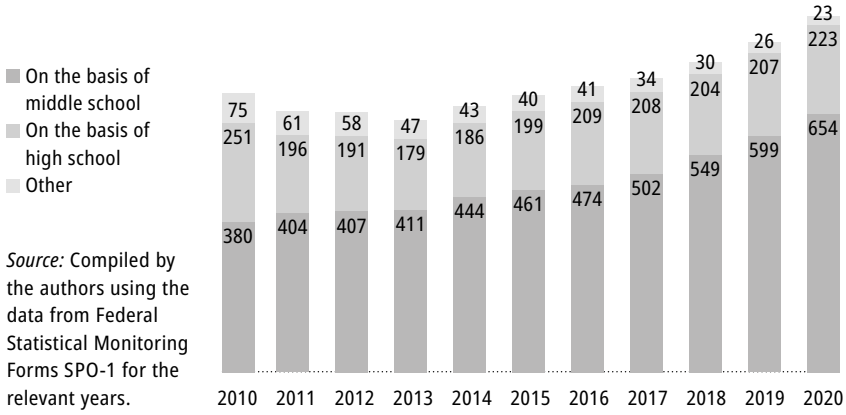
Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms SPO-1 and VPO-1 for the relevant years. SWP admissions statistics are cleansed of admissions to PVE programs in educational institutions of the Federal Penitentiary Service (FSIN).

to colleges (Bachelor's and Specialist's degree programs): 900,000 vs. 873,000, respectively.

The growth of TVET enrollment is driven by mid-level professional programs, in particular those on the basis of middle school (Figure 3). In 2020 alone, 654,000 students were admitted to such programs, which is 72% more than in 2010. A noticeable increase in TVET enrollment has been observed in all regions of Russia except Krasnoyarsk Krai. In 39 regions, growth rates are higher than the national average.

Mid-level professional programs, which correspond to ISCED levels 3–5, are deliberately analyzed separately from skilled-worker programs, i. e. former primary vocational education programs attract-

Figure 3. **The number of students admitted to MLPP, by educational attainment**, thousands.



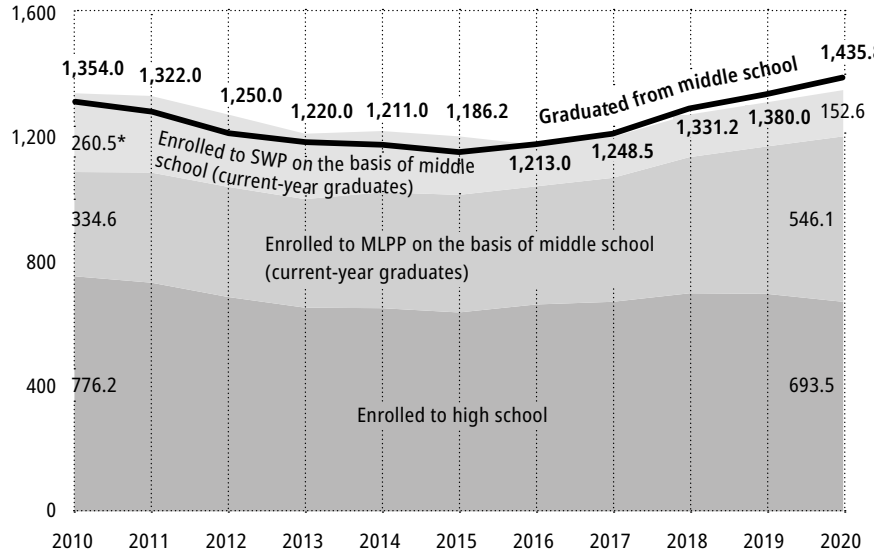
Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms SPO-1 for the relevant years.

ing students with specific socioeconomic characteristics [Dudyrev et al. 2019]. Gradually shrinking participation and stagnant enrollment in SWP are explained first of all by the objective decrease in demand for blue-collar workers in the context of structural changes in the Russian economy and labor market [Gimpelson, Kapelyushnikov, Roshchin 2017]. Skilled-worker programs remain an important but small and isolated segment of TVET, involved the least in the redistribution of student flows between vocational schools and colleges. The increase in TVET enrollment and the redistribution of student flows in favor of TVET are driven by participation in MLPP, so only this sector of TVET will be analyzed further in this article.

3. The Growing Popularity of the Vocational Track and the Non-Bypass Strategy: Middle and High School Graduates

The end of middle school is the major fork in students' educational choices in Russia [Bessudnova, Malik 2016; Khavenson, Chirkina 2019]. After completing middle school, students either proceed to high school and then most often to college or opt for TVET, reserving the opportunity to enter college in the future without taking the Unified State Exam (USE). It is this fork after middle school that has undergone structural changes over the past decade. Although the country is gradually getting out of the "demographic trough" and the population of 15-year-olds is increasing, high school enrollment remains stagnant (Figure 4), more and more middle-school graduates choosing the vocational track. In 2020, 38% of middle-school leavers enrolled in MLPP, compared to only 25.4% in 2010 (Figure 5). Overall, 48.6% (698,700) of all middle-school graduates opted for TVET programs in 2020. As a result, the academic and vocational tracks of middle-school graduates have become comparable in the size of enrollment.

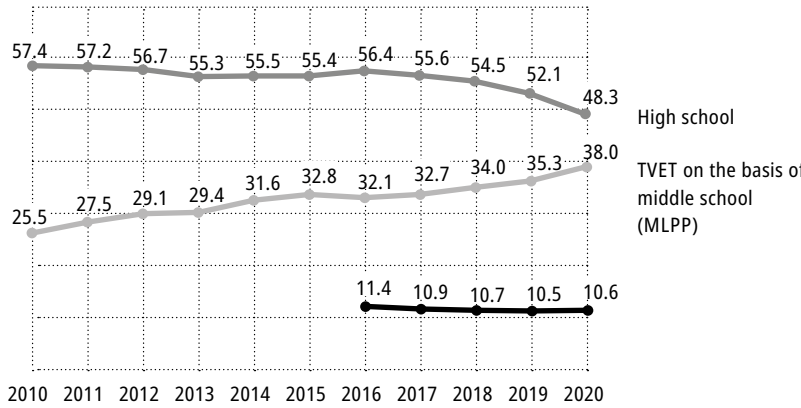
Figure 4. **The dynamics of middle school graduations, TVET enrollment on the basis of middle school, and high school enrollment**, thousands of students.



Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms OO-1 and SPO-1 for the relevant years.

Note: Up to 2016, data on SWP admissions on the basis of middle school includes same-year middle-school graduates as well as those who graduated earlier.

Figure 5. **Educational choices after middle school: students proceeding to high school or choosing TVET**, % of middle-school graduates.



Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms OO-1 and SPO-1 for the relevant years.

At first glance, the observed increase in MLPP enrollment on the basis of middle school (Figure 3) can be explained by the actively discussed middle school–TVET–college transit trajectory [Alexandrov, Tenisheva, Savelyeva 2015]. TVET graduates enter colleges without taking the USE, so this trajectory is often referred to as the "bypass maneuver". However, this explanation is not supported by statistics on the actual number of TVET graduates going to college right after obtain-

Table 1. **The dynamics of student flows in the TVET–college transit trajectory.**

Indicator	2013	2015	2016	2017	2018	2019	2020
"Transit" graduates of MLPP	117,536	139,743	123,716	127,923	126,775	123,235	116,514
% of "transit" MLPP graduates in college admissions	10.3	13.8	13.5	14.2	14.0	13.7	13.3
% of MLPP graduates admitted to college the same year	26.8	31.3	26.4	25.2	23.9	22.8	21.1
"Transit" graduates of SWP	17,035	16,176	18,351	18,835	18,177	16,803	16,331
% of SWP graduates admitted to college the same year*	5.2	6.1	9.2	9.7	10.8	10.2	11.5
% of "transit" SWP graduates in college admissions	1.5	1.6	2.0	2.1	2.0	1.9	1.9

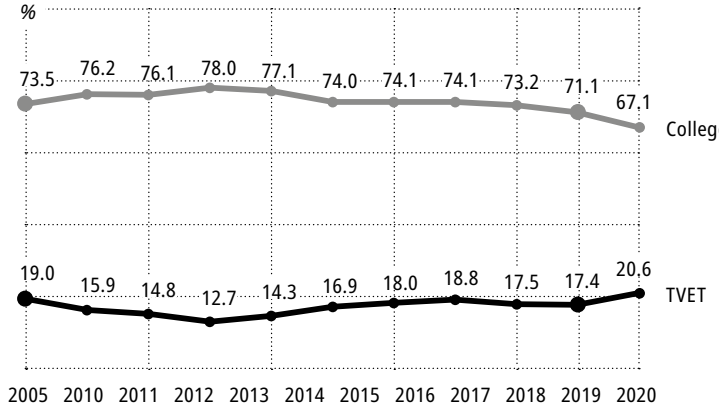
Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms SPO-1 and VPO-1 for the relevant years.
Note: *Graduates of PVE programs at FSIN educational institutions are excluded from the 2013–2015 statistics.

ing their vocational diplomas. "Transit" student flows are not growing; moreover, they are shrinking even in absolute numbers despite the increasing TVET enrollment on the basis of middle school (Table 1). The number of "transit" students — TVET graduates who enter college the same year they graduate from TVET institutions — dropped from 139,700 in 2015 to 116,500 in 2020, their proportion decreasing from 26.8 to 21.1%. This data also disproves the widespread belief shaped by surveys of TVET students that most of them are going to obtain college degrees as soon as they graduate: according to the 2015 Monitoring of Education Markets and Organizations (MEMO), such students account for 53.6% of total MLPP enrollment. Therefore, the observed increase in TVET enrollment is not explained by the expansion of the transit trajectory of accessing college via TVET.

The bypass strategy of accessing college via TVET has been widely discussed in research literature, but the structure of transit student flows remains understudied. For instance, little attention is paid to the 2019 HEI Performance Monitoring statistics that 14.1% of TVET students (440,200) were enrolled in college-based vocational schools which secure smooth transition to related college degrees. Straightforward inferences are impossible due to the lack of credible data, but ample indirect evidence (colleges running application campaigns to attract students to their vocational schools and pursuing accelerated TVET-college training strategies) allows assuming that the college-based segment of TVET contributes essentially to the TVET–college transit trajectory.

Transition to high school is classified under the academic track, so educational trajectories of high-school graduates are hardly discussed

Figure 6. **Educational choices after high school: % of high-school graduates enrolled to TVET institutions and colleges.**

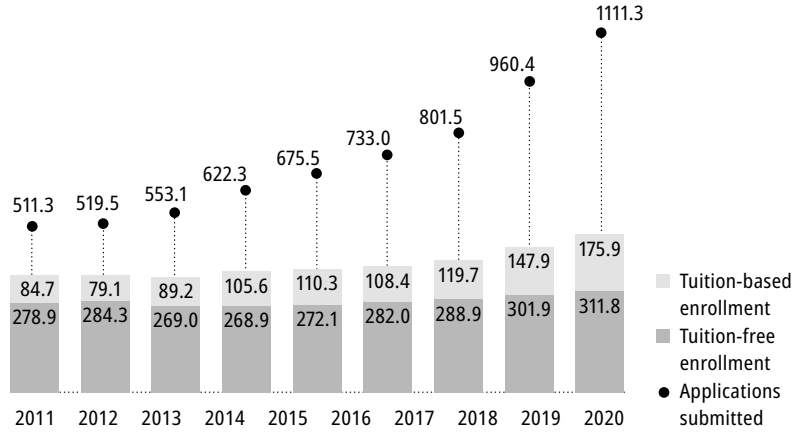


Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms OO-1, SPO-1, and VPO-1 for the relevant years.

in the context of TVET. However, high-school leavers also find themselves at a crossroads, their educational choices undergoing some major shifts. The percentage of high-school graduates proceeding to college has decreased from 78% in 2013 to 67% in 2020 (Figure 6), while the percentage of those choosing TVET has increased from 12.7 to 20%. High-school leavers choose between college and TVET, while choices made after middle school are not rigorously dichotomous, given that one third of TVET graduates enter colleges the same year they receive their vocational diplomas. For high-school graduates, TVET is certainly not a means of avoiding selective high school and the USE test, but a real alternative to college — a decision compelled by their socioeconomic status [Khavenson, Chirkina 2018] or a deliberate choice. However, the 2020 statistics should be interpreted with certain caution, as the considerable growth in the popularity of TVET among high-school leavers can be not only a continuing trend but also a response to the COVID-19 pandemic. This issue needs further investigation.

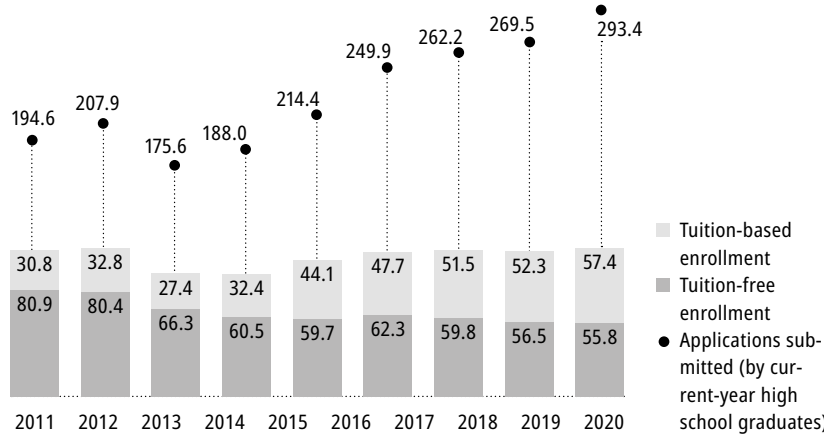
The redistribution of youth flows over the past decade has increased TVET enrollment and participation significantly. The TVET sector is expanding by virtue of MLPP on the basis of middle school, but the demand for MLPP is not explained by the growing popularity of the bypass strategy of accessing college via TVET. At the same time, the number of high-school graduates going to college is gradually reducing. Therefore, one could say that there is a real growth in the popularity of the vocational track among youth beyond using TVET as a springboard to college.

Figure **7. The number of students enrolled to MLPP on the basis of middle school (the year of graduation from middle school)**, thousands.



Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms SPO-1 for the relevant years.

Figure **8. The number of students enrolled to MLPP on the basis of high school (the year of graduation from high school)**, thousands.



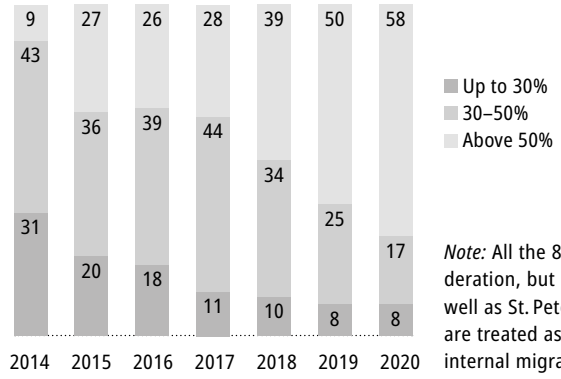
Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms SPO-1 for the relevant years.

4. TVET Response to Changes in Student Flows: "Bubbles" of Demand and Within-System Barriers

The increase in demand for the vocational track among school leavers has affected the main characteristics of the TVET system. Only five years ago, there were no barriers in the TVET trajectory: competition was close to zero, and most students were enrolled to government-funded places. Essential changes have occurred to the system since 2015.

First, the rapid increase in the number of applicants has made admissions competitive: on average, there are from 2.3 applications per admission place in programs for middle-school graduates to 2.6 in programs for high-school graduates (Figures 7–8). In 2019, according to

Figure 9. **The number of regions by the percentage of tuition-based enrollment to MLPP for high-school graduates (current-year graduation).**



Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms SPO-1 for the relevant years.

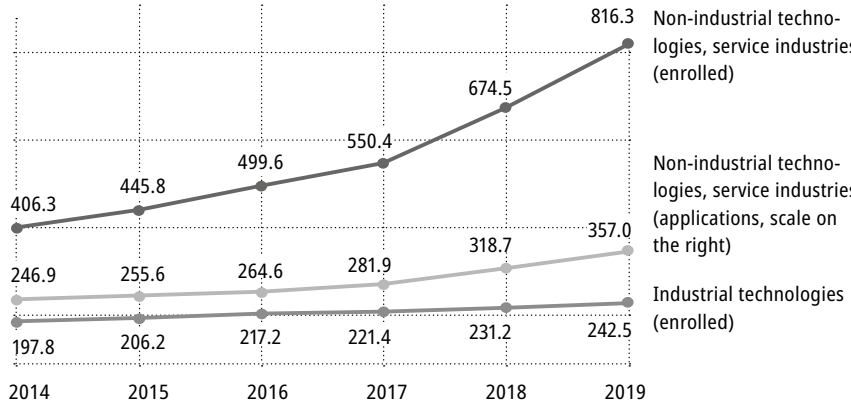
Note: All the 85 regions are taken into consideration, but Moscow and Moscow Oblast as well as St. Petersburg and Leningrad Oblast are treated as two macroregions due to heavy internal migration.

Federal Statistical Monitoring Forms SPO-1, admissions for high-school graduates were competitive in 47 regions of Russia, as compared to 28 in 2014, while competition for admission to programs on the basis of middle school reached six applications per admission place in some regions, e. g. Tyumen Oblast.

Second, there has been a growth in the number of self-funded TVET students, who accounted for 36% of total enrollment in programs for middle-school graduates. The segment of TVET programs on the basis of high school has seen an unusual situation where enrollment of self-funded students exceeds that of government-funded ones. In 2020, tuition-based enrollment exceeded tuition-free enrollment in 58 regions of Russia, as compared to only nine regions in 2014 (Figure 9). This situation in the segment of MLPP for high-school graduates is due to stagnant enrollment limited by admission quotas, combined with the outpacing growth in demand for TVET which is manifested in the number of applications.

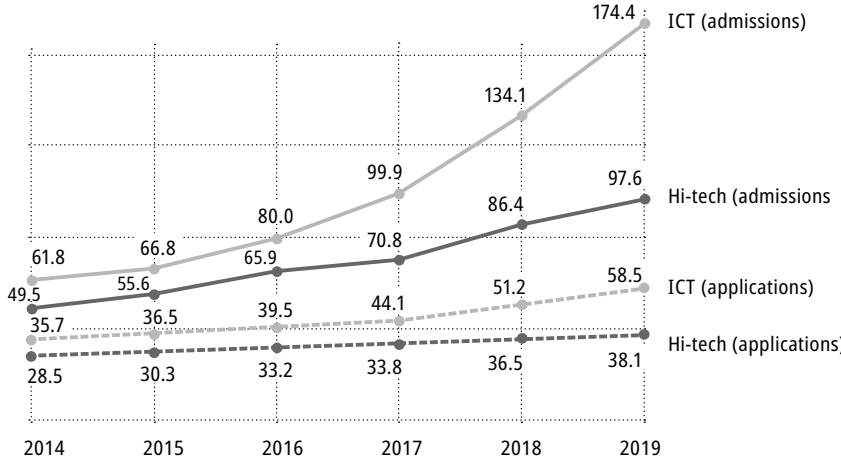
Third, there have been qualitative changes in TVET enrollment on the level of fields of study. Over the past five years, the tertiary sector has gained a foothold as the main field of study in MLPP, accounting for 60% of total admissions in 2019 (Figure 10.1). Enrollment to industrial technology specializations is not decreasing, but programs in service industries and other non-industrial technology fields have become a source of growth in the overall TVET enrollment through generating additional demand for TVET among middle-school leavers. ICT specializations are the driver of this demand (Figure 10.2), which is echoing the demand for mass education in the field of digital technologies. The number of applications for ICT-related TVET programs is 2.8 times higher than five years ago, yet admissions have only grown by a factor of 1.6.

Figure 10.1. **Middle-school graduates applying and enrolled to TVET programs (MLPP) by field of study**, thousands.



Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms SPO-1 for the relevant years.

Figure 10.2. **Middle-school graduates applying and enrolled to MLPP in ICT and High-tech specializations**, thousands.



Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms SPO-1 for the relevant years.

A similar situation is observed in the segment of TVET programs on the basis of high school. High-school graduates express a strong demand for service industries and specializations with no rigid qualification levels, such as IT or mass media (Table 2). Specializations with non-competitive admission include "traditional" manufacturing ones such as mechanical engineering or chemical technology as well as "old" service industries such as law, veterinary medicine, or zootechnics.

The situation with "bubbles" of demand for particular specializations and virtually no competition in others is very symptomatic. This

Table 2. **The dynamics (growth rate and competition) of the number of applicants to MLPP on the basis of high school, by fields of study.**

Field of study	2015	2017	2019	Growth rate between 2015 and 2019,%	Applications per admission place, 2019
Information Security	1,228	2,130	3,133	155	3.5
Mass Media and Library and Information Studies	969	1,519	2,221	129	2.8
Information and Computer Sciences	13,144	18,423	25,535	94	2.9
Aeronautics, Aircraft and Spacecraft Operations	3,186	43,05	5,942	87	2.8
Services and Tourism	12,585	16,238	19,898	58	2.2

Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms SPO-1 for the relevant years.

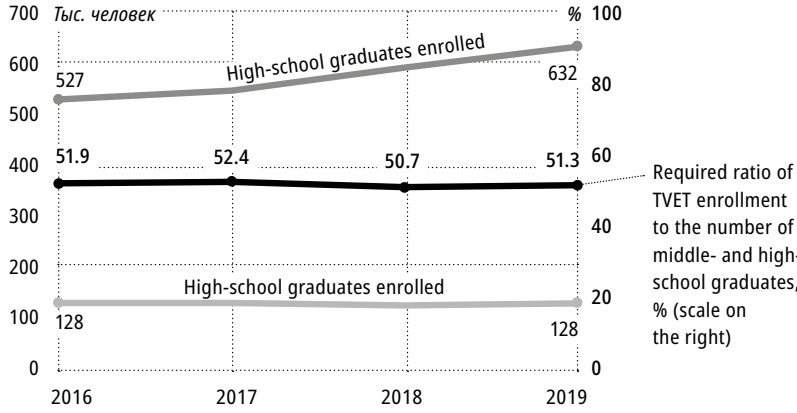
discrepancy between regionally controlled enrollments and the demand from school leavers and their families throws the system's readiness to respond to the changing demand into question. In particular, enrollment in MLPP for middle-school graduates remains unchanged despite the growing demand, which has already led to fierce competition not only for government-funded places but for self-funded ones as well.

In 2016, the Ministry of Education and Science of the Russian Federation adopted a regulatory document[8] prescribing regions of Russia to ensure that 50% of middle- and high-school graduates aged 15–19 are enrolled in TVET programs (SWP and MLPP), both tuition-based and tuition-free. The need to comply with this requirement during the final phase of the "demographic trough" has sharpened the existing limitations and priorities in TVET.

As high school was growing more and more selective, the TVET system was turning into an equipotent institution of secondary education [Dudyrev, Romanova, Shabalin 2017]. Performing an important social function, vocational institutions have become the "second-chance school" for less academically successful students who have to withdraw from secondary education after middle school. For this reason, regions of Russia have to prioritize middle-school graduates in establishing their TVET admission quotas to comply with Article 43 of the Constitution that guarantees "universal access <...> to secondary vocational education", while admission quotas for high-school leavers are determined by residual principle (Figure 11). Thus, compliance with the Ministry's requirement has not affected enrollment to programs for

[8] Methodological Guidelines on Developing a Network of Educational Institutions to Provide Educational Services to Population... No. AK-15/02 VH of May 04, 2016.

Figure 11. **Enrollment of middle- and high-school leavers to vocational schools since the adoption of the requirement for youth participation in TVET, thousands of students.**



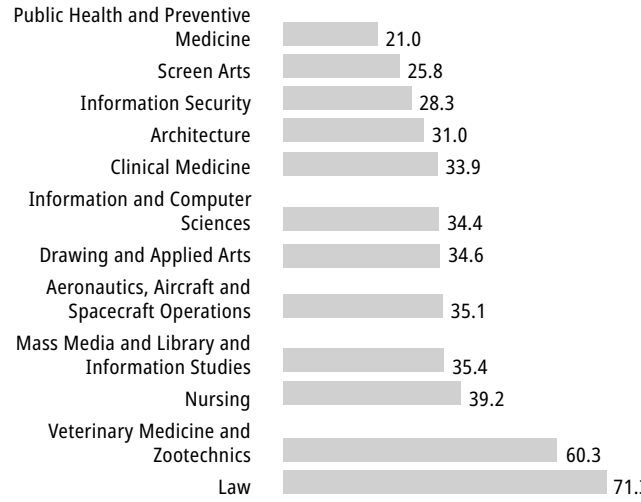
Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms SPO-1 and OO-1 for the relevant years.

middle-school graduates but has "frozen" the segment of TVET programs on the basis of high school.

Rigidity of the TVET system in the face of the changing demand manifests itself not only in the ratio of middle to high school graduate enrollment quotas but also in the emerging "bubbles" of demand for particular specializations. Relying on the existing methods of forecasting staffing needs, regions focus on providing workforce for large enterprises [Dudyrev et al. 2019] and preparing a sufficient number of workers in education and social services. As a result, the growing demand of youth for creative, tertiary-sector, and IT specializations is not reflected in enrollment quotas (Figure 12). In this situation, the most economically advantaged households tend to vote with their wallets, increasing the proportion of tuition-based enrollment, as it happens in the segment of TVET programs for high-school graduates, which in its turn leads to the redistribution of government-funded places in favor of more socially significant programs on the basis of middle school.

Changes in young people's demand for TVET have exposed the limitations of the existing TVET system structure. A guarantee of universal access is preserved for socially significant programs on the basis of middle school. However, this segment exhibits low responsiveness to structural changes in demand for specializations. The segment of TVET programs for high-school graduates, relatively small compared to programs on the basis of middle school, turns out to be the most rigid one. As higher education is getting less accessible and enrollment to programs on the basis of high school is getting "frozen", high-school leavers from low-SES families become especially vulnerable. Emergency measures taken during the 2020 pandemic exacerbat-

Figure 12. **Acceptance rates in MLPP on the basis of high school in 2019**, %.



Source: Compiled by the authors using the data from Federal Statistical Monitoring Forms SPO-1 for the relevant years.

ed the problem, and today's high-school graduates applying for TVET include not only those who deliberately choose the vocational track but also those who have been "pushed" out of the academic track for whatever reason.

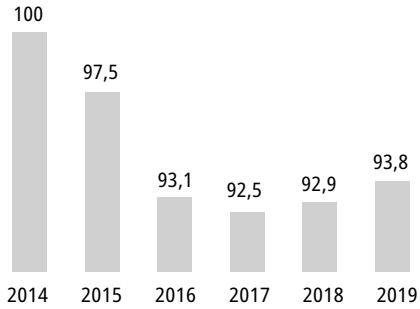
5. New Attractiveness of the Vocational Track: In Search of the Economic Rationale

The observed changes in young people's postsecondary educational choices are complex and cannot be reduced to a single underlying factor. Instead, one can talk about the interplay of different factors, both internal and external to the education system.

On the one hand, school leavers' growing interest for TVET derives from changes in the adjacent levels of education. Increasing selectivity of high school and decreasing accessibility of higher education contribute essentially to the redistribution of student flows between vocational schools and colleges. For example, institutionalization of the USE as a high-stakes test and inclusion of the mean USE score into regional authorities' key performance indicators (KPI) have affected the dynamics of middle to high school transitions [Dudyrev et al. 2019]. At the same time, the network of colleges is reducing, admission quotas for government-funded places are shrinking, and access to higher education is decreasing in most regions of Russia [Malinovsky, Shibanova 2020]. The secondary and higher education systems "push" students out, reducing low-SES school leavers' chances of getting onto the academic track.

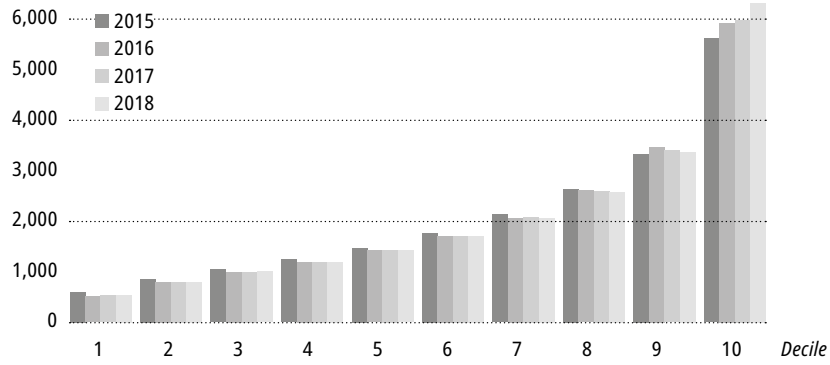
On the other hand, the growth in demand can also indicate a real surge of interest and trust in the vocational track under the influence

Figure 13. **The dynamics of household disposable income in Russia in 2014–2019**, % (2014=100%).



Source: Compiled and calculated by the authors using the data from the Sample Survey on Household Budgets for the relevant years: https://obdx.gks.ru/

Figure 14. **The dynamics of household disposable income per 100 household members in 2015–2018 by income deciles**, thousand rubles (based on the 2015 CPI).



Source: Analytical Center for the Government of the Russian Federation (2020) The Dynamics of Household Disposable Income: https://ac.gov.ru/uploads/2-Publications/rus_feb_2020.pdf

of "pull" factors. WorldSkills, international championships of vocational skills, has received governmental funding in Russia since 2012. Competitions aimed at raising the prestige of blue-collar jobs in the world have become a real tool for TVET development in Russia [Dudyrev et al. 2019] due to implementation of advanced industrial standards, re-equipment of vocational schools and workshops, teacher retraining, and the introduction of "demonstration exams". This and other initiatives under the auspices of WorldSkills Russia have been assigned 30.2%[9] of the budget allocated for the Young Professionals federal project, designed to promote vocational and higher education, for the period up to 2024.[10] Refreshment of the TVET image with

[9] Including funding for the WorldSkills Kazan 2019 International Competition.
[10] Calculated based on the Young Professionals Federal Project Passport: https://

the WorldSkills project has not been assessed in academic literature so far. However, there is no denying the fact that the initiatives of the recent decades have generated a positive media coverage for the development of TVET.

Since differentiation of postsecondary educational choices is largely determined by differences in family SES, changes in household disposable income are an important external factor in making decisions and balancing the probable costs and benefits. Household disposable income has been declining in Russia since 2014 (Figure 13) across all income groups except the top 10th decile. In 2015–2018, household disposable income declined in all income groups broadly classified as middle class (deciles 3 to 9) [Solimano 2008]) (Figure 14).

The ongoing decline in household disposable income could not leave family spending on education unaffected. Changes in household expenditure on vocational and higher education by income deciles are shown in Figures 15.1 and 15.2.

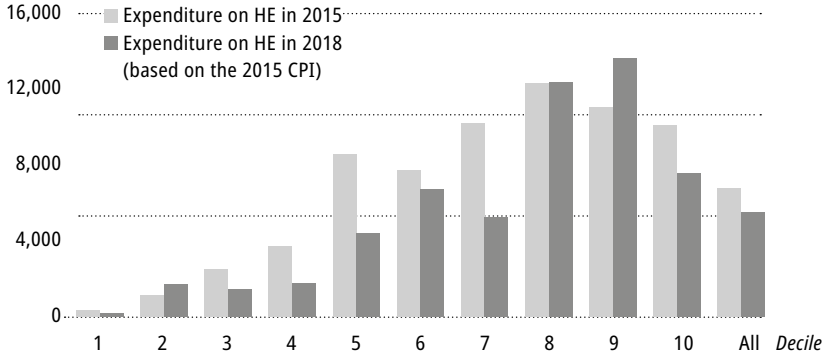
Current trends contravene the familiar thesis that higher education is the choice of the middle class while TVET is more likely to be pursued by lower-income groups. Household expenditure on higher education has shifted to the highest-income deciles, while plummeting in middle-class families (deciles 5–7). At the same time, the middle class is beginning to spend more on TVET. Of particular remarkability is the outpacing growth in expenditure on TVET in the 8th decile, which represents the upper range of the middle class and is often used as a reference group in assessing consumer behavior of the "real" middle class [Ovcharova et al. 2013]. Similar trends were documented by the Sample Survey on the Quality and Accessibility of Educational, Healthcare, Social Welfare, and Employment Assistance Services conducted by Rosstat in 2017. The highest-income groups (quintiles 4 and 5) accounted for only 31% of TVET enrollment in 2013, as compared to 52% in 2017.[11] Thus, the TVET sector has expanded by attracting children from middle-class families — an entirely new socioeconomic category of students for this system.

Based on the above, there are grounds for assuming that the vocational track (specifically MLPP) becomes a real alternative to college for a number of families in the context of constantly decreasing household disposable income. Furthermore, the existing socioeconomic situation works as a "pull" factor for not only low-income social groups [Abankina, Abankina 2020] but also middle-income families. Natural-

minobr.gov-murman.ru/files/Nach_proekty/molodye_prof/fp_molodye_professionaly_09102019.pdf

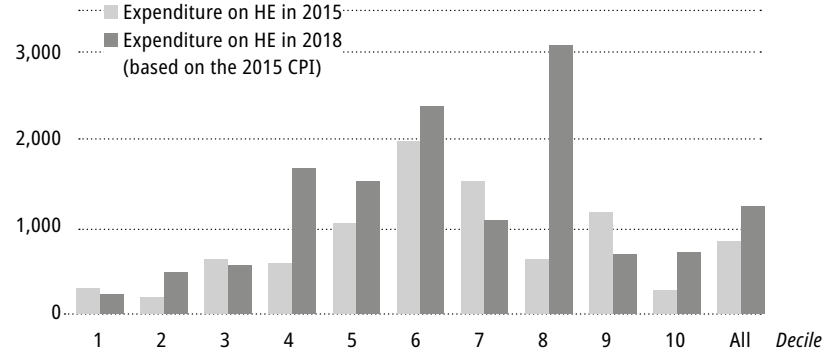
[11] As estimated by the Laboratory for University Development (Institute of Education, National Research University Higher School of Economics) based on the data from the Sample Survey on the Quality and Accessibility of Educational, Healthcare, Social Welfare, and Employment Assistance Services conducted by Rosstat in 2017.

Figure 15.1. **Changes in monthly household expenditure on higher education per 100 household members by income groups (deciles) in 2015–2018**, rubles.



Source: Compiled and calculated by the authors using the data from the Sample Survey on Household Budgets for the relevant years: https://obdx.gks.ru/

Figure 15.2. **Changes in monthly household expenditure on TVET per 100 household members by income groups (deciles) in 2015–2018**, rubles.



Source: Compiled and calculated by the authors using the data from the Sample Survey on Household Budgets for the relevant years. https://obdx.gks.ru/

ly, further research is needed to find out whether opting for TVET is a mid-term decision that indicates a deferred demand for higher education or whether it is a substantial shift in the expectations from educational and career trajectories. The existing statistics on TVET graduates entering college show no sign of pent-up demand. The percentage of TVET graduates in college enrollments has remained unchanged at the level of 35% since 2015.[12]

Why can TVET be a rational choice in the context of decreasing household disposable income and other "pull" factors? There can be three fundamental reasons for this.

[12] According to Federal Statistical Monitoring Forms SPO-1 and VPO-1.

5.1. Tuition

Higher education requires objectively more investments than TVET. First, according to MEMO data, tuition fees are on average twice as low in TVET than in higher education, and program duration in TVET is a little under three years for high-school graduates or around four years for middle-school leavers, compared to four years in Bachelor's degree programs. Second, cumulative expenditure on higher education often includes moving and accommodation expenses: colleges are much less numerous than TVET institutions and are distributed unevenly across the country. (According to the Training Quality Monitoring and the College Performance Monitoring, there were 4,627 vocational schools and only 1,264 colleges, including branch campuses, in 2019 in Russia.) As a result, additional expenses account for over 70% of annual expenditure on higher education [Gromov et al. 2016]. Third, there is another item of expenditure among those choosing the academic track: preparing for college admissions exam. Fifty percent of college students report having attended college preparatory courses, and 28% attended tutoring sessions prior to the admissions exam [Klyachko et al. 2019:6]. It is also important to bear in mind that less expensive, lower-risk ways of obtaining a college degree are largely blocked off: the past five years have seen numerous closures of college branch campuses (the number of colleges reduced by 1,000 in 2015–2018) and cuts in tuition-free admission quotas in part-time programs [Malinovsky, Shibanova 2020].

5.2. Job–Education Match

Engaging in TVET or higher education is about choosing not only an educational but also a career trajectory. Motivations related to salary and occupational prestige are key in both tracks [Konstantinovsky, Popova 2016]. No doubt, a college degree generates higher returns than a TVET diploma, specifically in 3–5 times [Melianova et al. 2020]. Following this logic, the choice seems obvious: college. On the other hand, school leavers should be guided in their educational choices by whether they will be able to find an education-matching job after they graduate and whether there will be enough job offers of acceptable quality in the labor market. Overqualified workers experience a wage penalty, earning less than workers who fill jobs matching their skills. According to the Russia Longitudinal Monitoring Survey — Higher School of Economics (RLMS-HSE), one in four workers in Russia are overqualified for their jobs and experience wage penalty associated with overqualification of up to one third of their salaries [Gimpelson, Kapelyushnikov, Lukyanova 2010]. In this case, to what degree is the observed redistribution of youth flows between TVET and higher education justified from the perspective of changes in the labor market?

Research on the changes that occurred to the occupational structure of employment in Russia in 2000–2015 shows that increased demand for higher education during that period can be considered economically justified [Gimpelson, Kapelyushnikov, Roshchin 2017]. An increase in the employment rate among college-educated people

(from 20.6 to 32.2%, according to Rosstat) was caused not only by supply-side factors, namely the growing college graduation rates, but also by demand-side factors, specifically the rearrangement of the industrial structure of economy which boosted the demand for high-skilled workers, in particular in the tertiary sector. However, the potential of structural shifts as boosters of demand for high-skilled professionals has been almost depleted, as the new industrial structure of economy has "solidified". As economic stagnation persists, the "jam" of high-skilled workers becomes a real threat. It is also important to make allowance for the probable effects of job polarization observed in many modern economies [Gimpelson, Kapelyushnikov 2015]. Job polarization happens when middle-skilled jobs — jobs that involve routine (including mental) labor — decline, i. e. the large segment of college graduate employment is vanishing. No such effects have been observed in Russia so far, but job polarization and worsening of the problem with overqualified workers are highly probable over the medium term [Gimpelson 2019].

However, school leavers and their parents barely have any access to this information, which means that their rationality in making educational choices is limited. On the other hand, it is TVET students' families, given their socioeconomic profile, that are most likely to deal with the challenges described above — routine jobs and wage penalty associated with overqualification — and signal their unmaterialized expectations of returns to college degrees, directly or not. As a result, the labor-market reality of school leavers' parents collides with the strategy of avoiding downward social mobility — i. e. ensuring that children's educational attainment is at least as high as that of their parents — as a prerequisite for rational educational choices [Breen, Goldthorpe 1997].

5.3. An Alternative to College in Particular Specializations

To a certain extent, treating the vocational and academic tracks as alternative options is a debatable approach in itself, given the dependence of educational choices on socioeconomic factors as well as the differences in expected career paths and salaries. If there is any alternativeness at all, it should be searched for on the level of specializations and fields of study with no rigid qualification levels or in programs that qualify graduates with the closest possible levels of skills, i. e. mid-level professional programs that are classified as ISCED level 5 (in global practice, this level is represented by Associate and Applied Science degrees) and are close to Bachelor's degrees in higher education (ISCED level 6).

High-school graduates applying to TVET institutions and colleges express a strong interest in the same fields of study (Table 3), mostly giving preference to creative specializations in the tertiary sector, i. e. those with no rigid qualification levels. There is international empirical evidence that in many of those career fields, college degrees do not guarantee access to jobs and are used less and less often as a filter in the selection process [Brown, Souto-Otero 2020; Chevaillier, Duru-Bel-

Table 3. **The most popular specializations in vocational (MLPP) and higher education programs, by the rate of growth in the number of applications submitted between 2015 and 2019.**

Field of study	MLPP on the basis of high school		Bachelor's/Specialist' degree programs	
	Growth rate ranking	Growth rate between 2015 and 2019,%	Growth rate ranking	Growth rate between 2015 and 2019,%
Information Security	2	155.1	5	73.6
Mass Media and Library and Information Studies	4	129.2	9	53.6
Veterinary Medicine and Zootechnics	5	102.0	11	46.6
Information and Computer Sciences	6	94.3	3	86.9
Aeronautics, Aircraft and Spacecraft Operations	7	86.5	6	63.4
Physical Education and Sports	9	62.0	15	39.1
Drawing and Applied Arts	11	52.5	18	36.2
Nursing	12	46.5	10	49.5
Architecture	15	38.5	14	41.0

Source: Calculated by the authors using the data from Federal Statistical Monitoring Forms SPO-1 and VPO-1 for the relevant years.

lat 2017]. Moreover, work experience remains the main employment barrier for TVET and college graduates in Russia [Lopatina et al. 2020].

Tuition-free education in a number of creative and in-demand tertiary-sector specializations is getting increasingly less accessible. In 2019, 83% of students enrolled to college programs in social sciences were self-funded [Abankina, Abankina 2020]. In this situation, the revealed similarities in school leavers' preferences between the vocational and academic tracks can hardly be explained by the assumption that students only apply for TVET programs as a plan B in case they fail to get into college.

Lower returns in TVET are the main argument for not treating higher and vocational education as alternatives. While the general trend is not disputed, it appears important to make it clear that returns to higher education are not homogeneous and depend, among other things, on college education quality.[13] Graduates from the most selective Russian colleges earn 23% more than those from the lowest-quality institutions [Roshchin, Rudakov 2016]. School leavers with relatively low socioeconomic characteristics are more likely to go to nonselec-

[13] The demarcation line between selective colleges (those of relatively high quality) and nonselective ones is the mean USE score of students enrolled, which should be at least 70 in a selective college [Dobryakova, Kuzminov 2016].

tive colleges [Prakhov, Yudkevich 2012; Prakhov 2015]. Therefore, those who opt for TVET after high school, i. e. high-school graduates with a relatively low SES [Khavenson, Chirkina 2018], do not just choose between TVET and higher education; rather, they choose between a vocational school and a nonselective college. In this case, the difference in returns between a TVET diploma and a college degree may not be that dramatic, given the specific features of popular specializations and the decreasing role of qualifications as a filter for candidate selection in the relevant industries.

The growing popularity of TVET is the outcome of mutually reinforcing factors within the education system, negative economic growth, and the situation in the labor market. Families and individuals make rational decisions under new circumstances by rebalancing the probable costs and benefits. In the existing socioeconomic context, middle-income groups have lower access to the academic track and are pushed to choose TVET over college. At the same time, more and more barriers and selection criteria emerge in the vocational track, generating tension for vulnerable social groups.

6. Discussion

A real growth in young people's demand for TVET is observed in Russia, and it cannot be explained by the "bypass" strategy alone anymore. School leavers and their families make informed and rational choices when they opt for TVET as a postsecondary trajectory. However, this shift in preferences can hardly be credited to the TVET sector, even though it has undergone some major positive transformations in the recent years, including reputation gains. Educational choices are made in specific socioeconomic contexts, which determine the balance of probable costs and benefits when choosing between TVET and college. Since the mid-2010s, there has been a permanent decline in household disposable income and access to higher education, which generates a threat of an excess of high-skilled workers in a stagnant economy. Those factors "push" low-SES school students out of the costlier and longer academic track into TVET. In terms of inequality of educational opportunity, the most vulnerable group is high-school leavers from low-SES families who cannot afford college but also suffer from decreasing access to TVET. These troubling trends were exacerbated by the COVID-19 pandemic.

The expanding TVET sector seems to have gained a second wind, yet it demonstrates unpreparedness for shifts in demand. Rigidity of institutional structure and interactions with the labor market, multiplied by the monumental proportions of the system, does not allow the sector to respond promptly to changes in the population's demands. TVET programs are not reorganized to meet the demand for specific careers, and tuition-based enrollments are growing despite the universal access requirement, while the growing demand for TVET among high-school graduates remains "invisible" to the sector. Having attract-

ed a new flow of students from the middle class in the recent years, the TVET system has become even more heterogeneous — serving both as the "second-chance school" and as a way of preparing hi-tech and creative professionals — while maintaining its institutional structure and functions. In a situation where the TVET system is still the largest producer of workforce in the country that actively attracts middle-school graduates, the old problems such as the quality of secondary education may come to the fore again with a vengeance.

The fork between the academic and vocational tracks is a crucial watershed and a space for inequality reproduction. The third, "transit" trajectory of transferring from vocational school to an accelerated college program without taking the USE was institutionalized in the 2010s. Obviously, this track is neither academic nor vocational in essence — but a chimeric educational trajectory, a choice compelled by the rigidity of the existing tracks.[14] The gap between TVET and higher education in Russia could be filled with relatively short-term programs for high-skilled technicians, by analogy to such global examples as Associate and Bachelor of Applied Science degrees [Chugunov, Vasilyev, Froumin 2010]. Potentially viable fields of study for such programs could be inferred from high-school leavers' demand for similar specializations in higher education and TVET. An attempt to integrate Bachelor of Applied Science degrees in Russia by means of top-down initiatives went down the drain. Perhaps, the emerging market situation and the population's demand will become better beacons in creating this "buffer zone" in the education system as well as an indicator of its completeness.

This article is an output of a research project implemented as part of the Basic Research Program at the National Research University Higher School of Economics (HSE University).

We are grateful to Irina Abankina, Viktor Bolotov, Fedor Dudyrev, Ivan Kravchenko, Dmitry Kurakin, Sergey Malinovskiy, Daria Platonova, Pavel Travkin, Isak Froumin, and Ekaterina Shibanova for their substantive comments on this article.

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[14] It remains possible that direct transition from TVET to higher education can be a comfortable trajectory in the context of career development. This track can also be pursued by students seeking to improve their competencies within one profession, which is often the case in teaching and medicine.

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Inequality of Educational Opportunity in Soviet and Post-Soviet Russia: An Empirical Analysis

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Received in October 2020

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Abstract

This study seeks to assess inequality of educational opportunity (IEO) in Soviet and post-Soviet Russia and measure the impact of specific circumstances. Inequality of opportunity suggests that outcomes significant for everyone or nearly everyone, such as income level, educational attainment or health status, are determined by factors or variables that are beyond individuals' responsibility (so-called circumstances) and by factors for which individuals are deemed responsible (so-called efforts). Inequalities arising from efforts are considered ethically acceptable, while those that are due to circumstances are considered offensive and therefore must be eliminated.

The study uses data from two waves (2006 and 2011) of the Russia Longitudinal Monitoring Survey administered by Higher School of Economics (RLMS-HSE). Research methodology is based on the *ex-ante* approach to equality of opportunity. Three levels of educational attainment are analyzed: secondary school, vocational school, and college.

Inequality of opportunity was lower during the Soviet period than in post-Soviet Russia at all levels of educational attainment, being the lowest at the level of at least secondary school and the highest at the level of at least vocational school. Parental education is the most powerful circumstance in both Soviet and post-Soviet periods, while ethnicity makes no significant contribution to inequality of opportunity. The roles of gender and place of birth are quite important in both periods and vary greatly as a function of educational attainment.

Keywords

circumstances, efforts, individual achievement, inequality of educational opportunity, post-Soviet Russia, Soviet Russia.

For citing

Ibragimova Z. F., Frants M. V. (2021) Neravenstvo vozmozhnostey v obrazovanii v sovetskiy i postsovetskiy periody: empiricheskiy analiz [Inequality of Educational Opportunity in Soviet and Post-Soviet Russia: An Empirical Analysis]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 2, pp. 43–62. https://doi.org/10.17323/1814-9545-2021-2-43-62

Education is perceived as a fundamental value in nearly all developed societies, while educational inequality — manifested in the dependence of individual achievement on circumstances beyond control (social background in the first place)—is interpreted as a vivid illustration of social injustice. According to the Russian Public Opinion Research Center (VCIOM), the majority of Russians are convinced that a college degree leads to career success and facilitates the achievement of life goals, although the percentage of such respondents has decreased noticeably over the last 11 years (from 76% in 2008 to 58% in 2019).[1] The belief that education has an essential influence on financial wellbeing has become more common since the beginning of the transitional period (70% in 2019 as compared to 47% in 1991). The past three years have seen an increase in the percentage of Russians who believe that higher education has become less accessible to everyone (from 53% in 2016 to 63% in 2019).

Educational inequality has been studied since the early 1950s. Research has been focused on identifying the mechanisms responsible for the maintenance of inequality in education and the factors promoting equalization of educational opportunity. A great contribution to the theoretical framework of inequality of educational opportunity (IEO) was made by the American sociologist Martin Trow [Trow 1973], who predicted the increase in access to higher education. Richard Breen and John H. Goldthorpe [Breen, Goldthorpe 1997] developed a theoretical model of educational decisions that explained the reproduction of IEO and the role of the psychological factor in this process. Theory of cultural reproduction developed by Bourdieu and Passeron [Bourdieu, Passeron 1977] emphasizes the role of cultural and educational differences among social classes in the development of educational inequality.

Empirical research in the field of IEO took a big leap with the development of measurement techniques within the framework of the theory of equal opportunities. This theory suggests that individual achievement such as income level, educational attainment or health status are determined by factors that are beyond individuals' responsibility (so-called circumstances) and by factors for which individuals are deemed responsible (so-called efforts). Theory of equal opportunities initially evolved along the lines of social philosophy — until Roemer proposed a mathematical formalization of the idea, which opened the door to rigorous quantitative methods [Ramos, van de Gaer 2016]. One of the innovative IEO-related studies proposing an advanced technique for inequality measurement was performed by Ferreira and Gignoux [Ferreira, Gignoux 2014].

Russia is a unique case in terms of IEO. Back in the Soviet period, equality of educational opportunity was one of the major goals of so-

Translated from Russian by I. Zhuchkova.

[1] Russian Public Opinion Research Center (2019) *Higher Education: A Social Elevator or a Waste of Time?* https://wciom.ru/index.php?id=236&uid=9808

cial policy which was supposed to be achieved by providing free educational services and ensuring a low level of economic inequality. Soviet propaganda declared this goal achieved, yet findings of Soviet and international researchers indicate that individual achievements were still dependent on social background. The post-Soviet years witnessed a sharp increase in economic inequality and an essential transformation of the education system due to the development of tuition-based programs. Those factors must have exacerbated the inequality of opportunity in education. At the same time, present-day Russia is part of some global trends promoting the equalization of educational opportunity, such as urbanization, advances in information technology, declining family size, and massification of higher education.

This study seeks to assess and compare the inequality of educational opportunity in Soviet and post-Soviet Russia. Scientific novelty of the research consists in applying advanced instruments offered by the theory of equality of opportunity. Research methodology is based on an *ex-ante* approach, indicators of inequality designed for binary outcome variables, and the Shapley decomposition to measure the contribution of individual circumstances.

The article is structured as follows: the first section describes the theoretical framework of IEO research; the second one gives a review of studies assessing the educational opportunity in Soviet and post-Soviet Russia; the third one describes the research methods and data; the fourth one presents the results of calculations and offers a discussion; and the conclusion summarizes the key findings and looks into their practical applications.

1. Theoretical Framework of IEO Research

On the theoretical level, researchers distinguish between primary and secondary effects of IEO [Barone, Ruggera 2018]. Primary effects occur when individual academic achievement correlates directly with family social status. This relationship is explained first of all by the economic factor of social background, specifically by the access of higher-income families to more favorable conditions of prenatal development, child delivery, and early childhood — primarily in terms of nutrition and healthcare which are crucial for cognitive development. Furthermore, there is an impact of cultural and educational resources: because the culture of a learning environment is similar to that of higher-income and better-educated social classes, children from families of high social status adapt easier to the new conditions and their abilities are better recognized and rewarded by teachers.

Secondary effects consist in that the conditional probability of proceeding to the next level of education for students with similar academic performance also correlates directly with social background. Secondary effects are explained, firstly, by the economic factor: expenses on completing the next level of education are relatively lower for higher-income social classes, which makes it easier for them to

make the respective decisions. Secondly, there is also a psychological factor: parental education is believed to be a reference point for children, meaning that if an individual does not achieve the level of their parents' educational attainment, they perceive it as a social failure. The desire to avoid failure is what motivates such students to move to the next education level. Therefore, objectively similar levels of education have a higher subjective value for individuals from better-educated families, which partially explains the secondary effects of IEO.

The mechanisms described above show that the problem is rooted in cultural, economic, and educational inequalities that have existed to a greater or lesser extent throughout history and across social structures. Nearly all the developed countries have seen an increase in economic disparities since the 1980s. This trend has been expected to exacerbate the problem. However, there are other socioeconomic changes as well, which contribute to equalization of educational opportunity. First, education is growing more and more accessible. Percentages of low-educated people in populations shrink over time, naturally increasing the proportions of well-educated ones. Educational attainment rates are growing, which is expected to weaken at least the cultural and educational factor of inequality. Second, duration and public funding of compulsory education programs are increasing. As a result, the role of economic inequality has been reducing at least at the basic levels of education. Third, urbanization and a more even distribution of educational institutions in the country are also expected to equalize educational opportunity. Cities have become centers of cultural, educational, and economic progress, so the ever-growing percentage of urban population reduces the transportation and accommodation expenses for college students, thereby weakening the economic factor of inequality and most probably reducing the role of the cultural and educational factor. Fourth, declining family size translates into greater potential investments in education per child, reducing the significance of the economic factor. Fifth, advances in information technology expand access to educational resources for the majority of population, which is also supposed to contribute to equalization of educational opportunity. Sixth, the primary effects of IEO are also reduced by the expansion of maternity and child welfare services and advances in medical technology.

That way, the ongoing socioeconomic changes can have multidirectional influence on IEO, increasing or reducing it depending on which mechanisms eventually prevail: the ones widening the gap or equalizing the chances.

The dynamics of economic inequality indicators in Russia differs essentially from the trends typical of developed capitalist countries, where economic inequality has increased gradually since the 1980s. Inequality in the Soviet Union was fairly low, but the transition to a market economy gave a boost to social segregation, which reached very high levels within a short period of time (1990–2000).

Furthermore, Russia's education policy has not aimed to increase the duration and public funding of compulsory education programs as in modern developed countries. Government participation in education funding was greater in Soviet Russia than today. Free education at all levels in the Soviet education system was an important tool in achieving the declared goal of equal opportunity in all spheres including education, which essentially weakened the economic factor of inequality.

The global development trends that are significant in terms of IEO, such as increasing access to education, urbanization, declining family size, advances in information and medical technology, and expansion of maternal and child welfare services, are very much the same in Russia as in other countries.

2. Educational Opportunity in Soviet vs. Post-Soviet Russia

Soviet sociologists began to study educational opportunity in the 1960s, invariably finding evidence for the impact of social background on individual educational achievement [Shubkin 1965; Samoylova 1978]: children of better-educated and higher socioeconomic status parents are more likely to pursue and complete college education than children from less advantaged families, and the same is true for urban vs. rural children, respectively.

Soon after the Soviet Union collapsed, the American sociologists Theodore P. Gerber and Michael Hout published an article dedicated to educational stratification in Russia during the Soviet period [Gerber, Hout 1995]. They provided a detailed analysis of the Soviet education system, applying multifactor regression analysis to the results of two sociological surveys to assess how the completion of certain education levels is affected by such circumstances as gender, parental education, and urban origin. Their findings indicate that gender and family background in the Soviet era had a significant impact on the probability of completing all education levels; and urban origin, on obtaining a college degree.

Two decades later, Anna Smolentseva [Smolentseva 2016] found that higher education expansion as part of a neoliberal reform package had not brought about greater social justice. In her opinion, expansion, fee-based financing, and policy measures such as university excellence initiatives tended to strengthen the institutional and social stratification of the higher education system, undermining social mobility and social equality in Russia.

A study of educational and career orientations of upper-grade secondary school students and the opportunities of school graduates in Soviet and post-Soviet Russia [Konstantinovskiy 2012] showed that social differentiation among schools increased during the transition period, children from the higher strata receiving better quality secondary education. In the Soviet era, at the period of significant changes in the country, and after those changes, youth from the high social stra-

ta had greater possibilities for access to higher education than youth from low social strata.

There are still very few studies assessing educational opportunity in Soviet Russia as compared to the post-Soviet period. As for using the theory of equality of opportunity to assess IEO, this approach is a novelty for sociologists both in Russia and abroad.

3. Research Goal, Methodology, and Data

This study is aimed at comparing the inequality of educational opportunity in Russia between the Soviet and post-Soviet periods and measuring the contribution of individual circumstances to IEO.

The theory of equal opportunities, which emerged at the end of the 20th century as an evolution of the egalitarian theory of social justice, argues that individual achievement is determined by factors or variables that are beyond individuals' responsibility (so-called circumstances) and by factors for which individuals are deemed responsible (so-called efforts). Inequalities arising from efforts are considered ethically acceptable (the reward principle), while those that are due to circumstances are deemed offensive and therefore must be eliminated (the compensation principle).

Attempts to mathematically formalize the idea of equal opportunity have encountered a number of challenges, in particular the incompatibility of compensation and reward principles [Ramos, van de Gaer 2016].

Methods of IEO assessment are based on the compensation principle. An *ex-post* or an *ex-ante* view can be taken to assess whether equality of opportunity has been achieved. According to the *ex-ante* criterion proposed by Van de Gaer, there is equality of opportunity when individuals from groups with homogeneous circumstances have on average the same level of achievement. According to the *ex-post* criterion formulated by Roemer, there is equality of opportunity when individuals with similar efforts have the same level of achievement. The *ex-post* and *ex-ante* versions of the compensation principle are incompatible with each other [Fleurbaey, Peragine 2013].

In the present study, inequality of opportunity was estimated using the method first proposed in [Chávez-Juárez, Soloaga 2014]. It is based on the *ex-ante* approach and involves the following steps.

1. An ordinal variable is decomposed into a set of binary variables. A binary variable takes the value of 1 if the relevant level of achievement has been attained by an individual; otherwise, it equals 0.
2. A probit model controlling for circumstances is estimated for each binary variable.
3. Probit regressions are used to calculate predicted values $\widehat{\rho_i}$ of the probability that the outcome variable takes the value of 1. Values $\widehat{\rho_i}$ depend only on specific sets of circumstances and are regarded as estimates of their effects. The inequality index I, calculat-

ed based on distribution $\{\hat{p}_i\}$, represents an absolute inequality measure. In case of a binary achievement variable, two measures are used to assess inequality: the dissimilarity index *DI*, calculated with formula (1), and the modified dissimilarity index *MDI*, calculated with formula (2).

$$(1) \qquad DI(\bar{\hat{p}}_k) = \frac{1}{2N(\bar{\hat{p}}_k)} \cdot \sum_{k=1}^{N} |\hat{p}_k - \bar{\hat{p}}_k| ;$$

$$(2) \qquad MDI(\bar{\hat{p}}_k) = \frac{2}{N} \cdot \sum_{k=1}^{N} |\hat{p}_k - \bar{\hat{p}}_k| .$$

In formulas (1) and (2), N is sample size, $\hat{p}_k$ is predicted value of probability, and $\bar{\hat{p}}_k$ is the mean of probability distribution $\{\hat{p}_k\}$.

Both indices, *DI* and *MDI*, vary from 0 to 1. The difference between the two is that *DI* is a translation invariant measure while *MDI* is a scale invariant measure. Using *DI* as an index of inequality in case of binary outcomes was proposed for the first time in [Barros 2009]. Later on, it was discovered that scale invariant measures of inequality are more preferable in case of a binary variable, since *DI* will decrease as long as access to an outcome increases [Chávez-Juárez, Soloaga 2015]. This is not quite appropriate if the goal is to measure the inequality of opportunity without the "impurities" such as changes in the access to an outcome. For this reason, *MDI* appears to be a more preferable choice. In the present study, IEO is measured using both indices with the primary focus on *MDI*.

4. The Shapley decomposition is used to measure the contribution of individual factors to IEO (for more, see [Shorrocks 2012]).

The study uses data from two waves (2006 and 2011) of the Russia Longitudinal Monitoring Survey administered by Higher School of Economics (RLMS-HSE).[2] The choice of these two waves is explained by the fact that they contain information on parental education, which was not collected during the other waves. Other circumstances included in analysis are gender, ethnicity, and type of place of birth.

Parental education can be controlled for by taking into consideration either father's and mother's education individually or both parents' highest level of educational attainment. Both approaches have their pros and cons. The former allows a more detailed analysis of parental education, but it excludes respondents with missing data on

[2] Russia Longitudinal Monitoring survey (RLMS-HSE), conducted by National Research University Higher School of Economics and OOO Demoscope together with Carolina Population Center, University of North Carolina at Chapel Hill and the Institute of Sociology of the Federal Center of Theoretical and Applied Sociology of the Russian Academy of Sciences (RLMS-HSE websites: http://www.cpc.unc.edu/projects/rlms, http://www.hse.ru/rlms).

at least one parent's education, which may be the case with students from single-parent families. This results in self-selection bias, where missing data patterns are not random and potentially vulnerable social groups are excluded from analysis. The latter approach does not have this limitation but uses a rougher measure of parental education. In the present study, measurements were performed using both approaches in order to compare the results and test their robustness.

The original variable describing educational attainment contains six levels. However, due to low relative frequency of the levels "0–6 years of school", "7–8 years of school", "7–8 years of school + some courses", data for them is aggregated and hereinafter described as "some secondary school". This yields four levels of educational attainment and three binary variables describing the completion of three levels: secondary school, vocational school, and college.

Analysis included respondents aged 25–70 without missing data on gender, ethnicity, place of birth, respondent's education, and parental education. In order to compare the IEO situations between the Soviet and post-Soviet periods, the sample was divided into two subgroups: respondents who were aged 24+ in 1990 and/or had achieved their highest level of educational attainment before 1991, and those who were aged 16 or younger in 1990. The 2011 wave subsamples are more comparable in size, so calculations based on them are treated as reference. Descriptive statistics are given in Table 1.

As seen in Table 1, the post-Soviet period features a considerably higher percentage of children born in urban areas and, accordingly, an essentially lower percentage of those born in rural areas than the Soviet era. This reflects the process of urbanization, which is believed to have equalizing effects on educational opportunity. There is also a very wide gap in the level of parental education: the percentage of respondents with the lowest-educated parents (some secondary school) is very high in the Soviet-period subsamples (over 60%) as compared to the post-Soviet period (16–28%), where percentages of better-educated population are noticeably higher. This data indicates that access to education was improving throughout the Soviet era and confirms the trend for growing accessibility of upper education levels, which is often regarded as a factor contributing to equalization of educational opportunity. The distribution by gender and ethnicity looks very similar across all the subsamples.

The four levels of educational attainment allow identifying three education levels and estimate their accessibility, i. e. the percentage of individuals who have achieved a particular level (Table 2).

4. Results and Discussion

Table 3 presents the results of probit regressions based on parents' highest level of educational attainment and the 2011 survey data. The rest of the results is not displayed due to article length limits but is available upon request.

Table 1. **Descriptive statistics for data used in calculations based on parents' highest level of educational attainment.**

Indicator	2006		2011	
	Soviet period (N=1,697)	Post-Soviet period (N=425)	Soviet period (N=1,929)	Post-Soviet period (N=1,199)
Gender				
Male	40.90	41.88	40.26	44.79
Female	59.10	58.12	59.74	55.21
Type of place of birth				
Urban	31.23	46.35	29.77	49.96
Semi-urban	13.85	17.65	13.71	14.51
Rural	54.92	36.00	56.52	35.53
Ethnicity				
Russian	82.20	79.06	83.43	82.90
Other	17.80	20.94	16.57	17.10
Parents' highest educational attainment				
Some secondary school	67.53	16.24	62.44	16.85
Secondary school	9.90	26.35	13.61	22.44
Vocational school	12.20	28.71	12.68	30.19
College	10.37	28.71	11.27	30.53
Respondent's educational attainment				
Some secondary school	12.85	15.06	9.71	13.18
Secondary school	38.54	32.24	42.23	29.02
Vocational school	26.40	22.12	28.10	22.52
College	22.22	30.59	19.95	35.28

Table 2. **Accessibility of education levels based on the data used in calculations based on parents' highest level of educational attainment.**

Education level	2006		2011	
	Soviet period	Post-Soviet period	Soviet period	Post-Soviet period
At least secondary school	87.15	84.94	90.29	86.82
At least vocational school	48.62	52.71	48.05	57.80
At least college	22.22	30.59	19.95	35.28

Table 3. **Results of probit regressions based on parents' highest level of educational attainment.**

Education level	Secondary school		Vocational school		College	
Period	Soviet	Post-Soviet	Soviet	Post-Soviet	Soviet	Post-Soviet
Gender						
Female	0.0553***	0.0806***	0.2019***	0.1277***	0.0241	0.0827***
Place of birth						
Semi-urban	–0.0148	–0.0067	–0.0684**	–0.0206	–0.0609**	–0.0379
Rural	–0.0104	–0.05220**	–0.0755***	–0.0681**	–0.0894***	–0.0986***
Ethnicity						
Non-Russian	0.0136	0.0540***	–0.0261	–0.0442	0.0012	–0.0058
Parental education						
Secondary school	0.0655***	0.1461***	0.2378***	0.1340***	0.1145***	0.0716**
Vocational school	0.1113***	0.2597***	0.3192***	0.4107***	0.2123***	0.2799***
College	0.1122***	0.2981***	0.3727***	0.5037***	0.4159***	0.4546***

Note: *, **, and *** indicate significance at levels 10%, 5%, and 1%, respectively.

Table **4. Inequality of educational opportunity: the 2011 survey data used for calculations based on parents' highest level of educational attainment.**

Education level	Secondary school		Vocational school		College	
Period	Soviet	Post-Soviet	Soviet	Post-Soviet	Soviet	Post-Soviet
MDI	0.0965	0.2054	0.3256	0.3885	0.2812	0.3728
Including the contribution of factors						
Parental education	62.81	69.20	63.52	74.99	78.23	77.22
Gender	20.85	13.70	21.24	11.82	2.84	5.70
Place of birth	10.76	14.68	13.65	8.91	18.19	14.58
Ethnicity	5.57	2.42	1.99	4.27	0.74	2.50
DI	0.0265	0.0585	0.1630	0.1621	0.3284	0.2497
Including the contribution of factors						
Parents' highest level of educational attainment	62.81	69.20	63.12	75.00	78.18	77.18
Gender	20.85	13.70	21.27	11.81	2.86	5.72
Place of birth	10.76	14.69	13.63	8.93	18.24	14.61
Ethnicity	5.57	2.41	1.98	4.27	0.74	2.49

Gender is a significant factor in achieving every level of education: all other things being equal, women are more likely to succeed than men. Rural origin, on the contrary, has a negative impact: the marginal effects are significantly negative for the reference category (urban) at nearly all times. Higher levels of parents' educational attainment correlate positively with achievement of all the three education levels. Ethnicity plays no big role, the marginal effects most often being insignificant. High statistical significance of the circumstances included in analysis indicates that IEO is a major issue for both Soviet and post-Soviet Russia.

The results of measuring the inequality of educational opportunity during the Soviet and post-Soviet years using MDI are presented in Table 4 and Figures 1 and 2.

As can be seen in Figure 1 and Table 4, IEO is lower during the Soviet period than in post-Soviet Russia at all the three education levels. In all the calculations, the lowest IEO is observed at the level of secondary school; and the highest, at the level of vocational school — not college, as one would expect. Our hypothesis to explain this phenomenon is that obtaining a college degree requires much more effort than completing any other level of education, so circumstances play a smaller role at the level of college.

As can be seen from Figure 2, DI-based measurement yields a different picture. DI is an integrated indicator that reflects both educational inequality and access to education. An essentially higher level of college education accessibility during the post-Soviet period translates into a lower DI than in the Soviet era.

Figure 3 shows the contribution of individual circumstances to IEO. Parental education is the strongest factor in both periods, accounting for 60–70% of the inequality. It correlates with a number of other family background factors excluded from analysis due to missing data, such as family income and family's educational and cultural resources, so the obtained estimate of the contribution of parental education also partially encapsulates the impact of those omitted family background factors. It follows from Figure 3 that the role of parental education is only increasing in the post-Soviet period — apparently, due the increased socioeconomic stratification of Russian society.

Ethnicity as a factor of IEO plays no essential role in both periods. The contribution of gender, meanwhile, is quite significant in Soviet as well as post-Soviet Russia, varying greatly across education levels. Origin is also an important factor, however much less powerful in the post-Soviet period than in the Soviet Union. This trend should be regarded as positive, specifically as a decrease in the effects of the spatial factor of IEO. This could probably be explained to some extent by advances in information and communication technology that provides equal access to digital educational and information resources to virtually everyone regardless of their place of birth and residence.

Figure 1. **Inequality of educational opportunity in Russia measured using the MDI.**

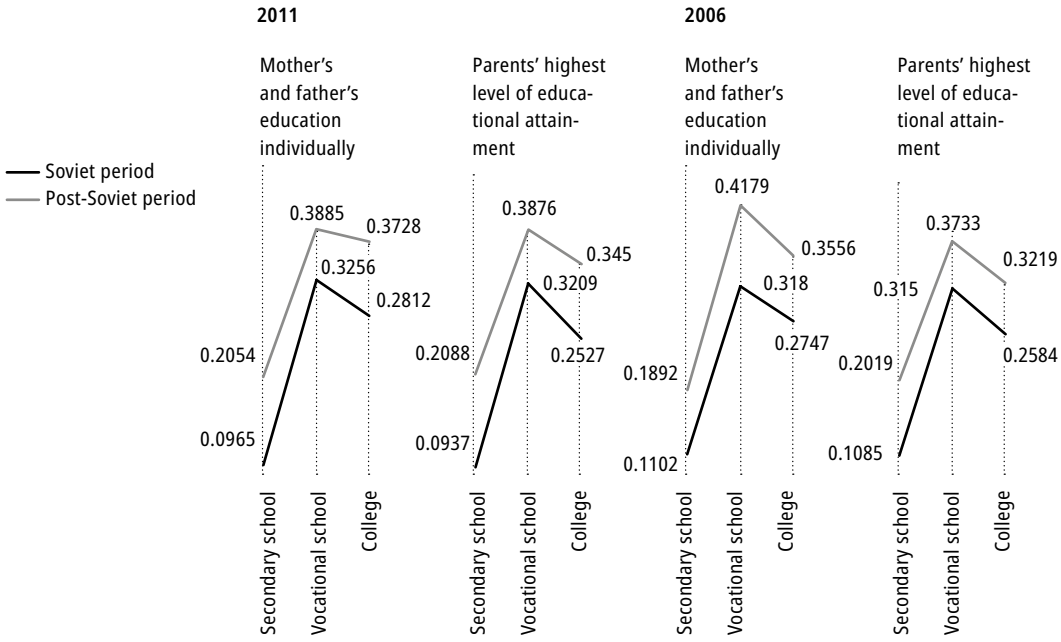


Figure 2. **Inequality of educational opportunity in Russia measured using the DI.**

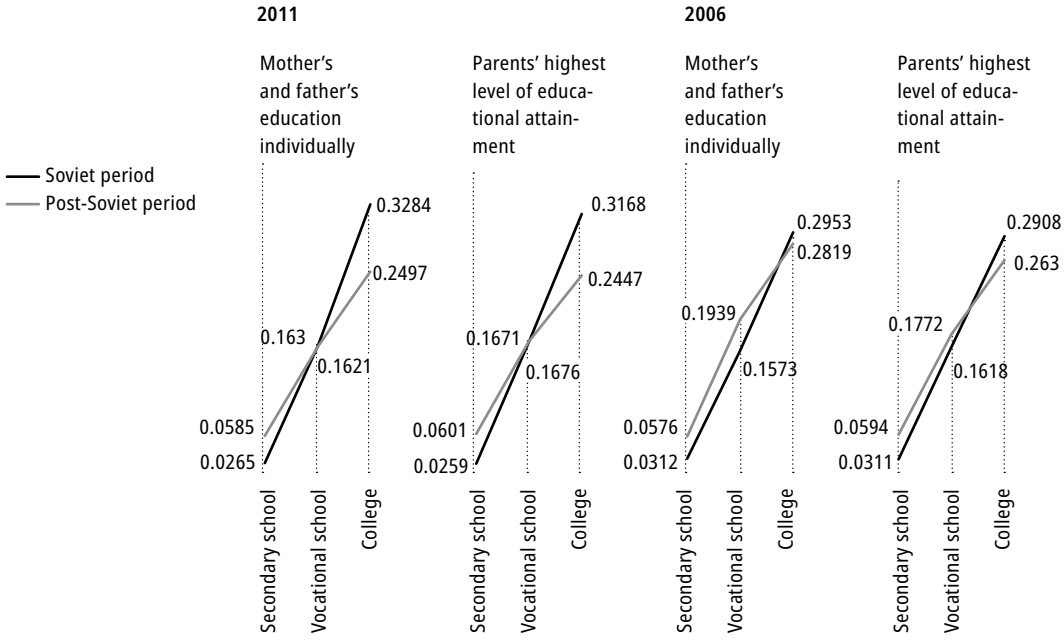
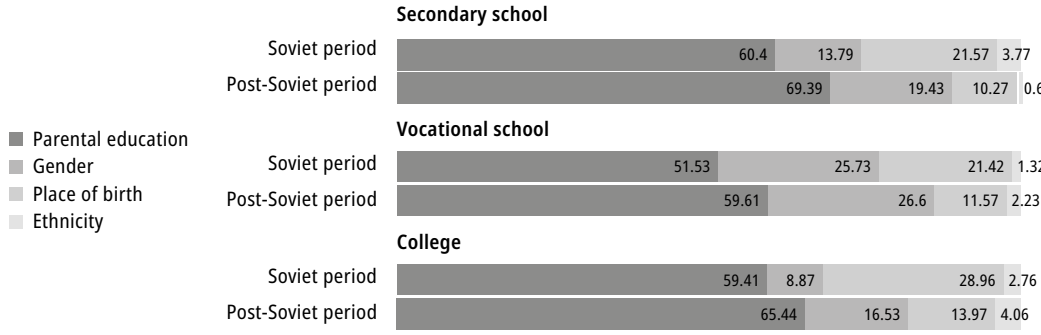


Figure 3. **The contribution of individual circumstances to IEO,** %.



Just as any empirical research, our measurements have some limitations. First, we could only take into account the circumstances for which data was available in the database. Assessment of the impact of family background would certainly have been more accurate if there had been a possibility to use not only parental education but also family income, family emotional climate, family size, and family composition in the analysis. The geographic factor restricted to the type of place of birth is also imperfect, as locality's socioeconomic status and distance from major educational hubs matter too. Data inadequacies in IEO research are well-known: large, ready-to-use, nationally representative surveys like RLMS-HSE have not been designed to measure inequality, so calculations are based on "what is available". Inadequate consideration of circumstances results in the underestimation of educational inequality and is fraught with misinterpretation of cause and effect relationships.

There is a hypothesis that expansion of access to education, especially at the college level, leads to higher horizontal differentiation of educational institutions. Otherwise speaking, institutions formally providing access to the same level of education may differ substantially in the quality of their programs. The present study does not make allowance for horizontal differentiation of colleges. Higher education as such can be fairly accessible to population at large, but inequality may well manifest itself in obtaining top-tier college degrees that are in high demand in the labor market. There is empirical evidence that admission to top-ranked colleges is largely determined by family background [Khavenson, Chirkina 2018].

Transformation of the education system and society as a whole during the post-Soviet period had substantial effects on the quality of enrollment. A rapid growth of the tuition-based sector of college education and its large share in the higher education market (about 50%) allow low-performing candidates to enter institutions of higher and vocational education. As educational institutions are financially moti-

vated to keep high admission and retention rates, weak students do not drop out but successfully graduate and get their diplomas. As a result, formally identical levels of education in Soviet and post-Soviet Russia may differ greatly in the actual amount and quality of the knowledge provided. Naturally, those differences could not be considered in this study either.

Comparability of formally identical education levels across different periods of history of a country or across countries during the same period is a common stumbling block for researchers and a source of criticism of studies which use educational attainment as a measure of individual educational achievement and parental education as an indicator of family background. "Does a student learn the same amount in 6th grade in Zambia as in Finland? Is the value of one year of schooling the same even across different schools in a single country or city?" [Ferreira, Gignoux 2014:211] Recently, as different projects have compiled school-based surveys that administer cognitive achievement tests to samples of students across a number of countries, as well as collecting information about the students' families and the schools they attend, a new frontier for IEO research has emerged that relies on comparable tests as a more objective measure of educational achievement. The Trends in International Mathematics and Science Study (TIMSS) and the Program for International Student Assessment (PISA) are perhaps the best known examples. However, such projects focus on school students' performance. The sector of professional education is much more diverse in terms of curricula and content, so developing a universal test for college students is a huge challenge. Second, these tests have been applied relatively recently, so using them to analyze the dynamics of educational inequality is only possible for the relatively short period of the past 20–25 years (PISA was first performed in 2000, and TIMSS in 1995).

The findings obtained in the present study that indicate an increase in the inequality of educational opportunity during the post-Soviet period are of great practical importance. First, the growing inequality of access to education may set the stage for exacerbation of social tensions. In this regard, it is important to understand how much Russia's population is concerned about social justice and how sympathetic it is toward the idea of equal opportunities.

Increasing inequality of educational opportunity may also have a negative impact on economic growth. IEO-induced barriers prevent self-actualization in discriminated social groups, affecting aggregate economic output at the macro level. To succeed, society must create incentives and opportunities for maximum self-fulfillment for the majority of population. In this regard, inequality of educational opportunity is most probably even more significant than income inequality of labor market opportunity. Indeed, IEO largely predicts subsequent inequalities in the labor market, and its effects are experienced at earlier stages of life, when individuals are much more vulnerable to adverse circumstances.

5. Conclusion

Analysis of inequality of educational opportunity in Soviet Russia showed that individual educational achievement was influenced by circumstances beyond individuals' control, such as parental education, gender, and place of birth. Given that economic inequality was low and there were virtually no tuition fees during that period, the results of analysis demonstrate a significant role of cultural, educational, and psychological factors in the maintenance and reproduction of educational inequality.

The post-Soviet period is characterized by a sharp increase in economic inequality and growth of the tuition-based sector at all stages of education. Such processes contribute to the inequality of educational opportunity, which is proved by comparisons performed in this article.

From a practical perspective, there are two major negative implications of the growing inequality of educational opportunity: it may exacerbate social tensions and slow down the socioeconomic development as a result of low self-actualization in vulnerable social groups.

The reported study was funded by the Russian Foundation for Basic Research (RFBR) as part of research project no. 19–010–00453.

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A Transmedia Turn in Educational Strategies: Storytelling in Teaching Literature to School Students

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Received in September 2020

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Abstract

The article presents theoretical and methodological approaches to using modern media technology in teaching humanities at school. Mediatization of a broad range of cultural practices has altered the mechanisms of cultural memory formation, so school students' online communication skills should become the foundation of literary education to achieve a balance between tradition and modernization.

Transmedia educational strategies proposed in the article allow implementing the principles of humanistic education in teaching humanities subjects. Narration, in its turn — as a method associated with the Russian tradition of teaching literary arts — allows applying the findings of modern semiotic, narratological, and media studies to promote the development of pedagogical practices. In narrative-based learning, the literary text becomes the core of a transmedia project, in which the teacher and students act as directors using various media formats to construct their own narratives on the basis of the writer's script. Transmedia adaptation of literary classics helps students reconceptualize characters' ambitions and values, develop creative and critical thinking skills, and get a better understanding of historical and everyday contexts. Cross-platform engagement invokes multiple layers of meaning and artistry, immersing all project participants — students as well as teachers — into a common space of communication, aesthetic experience, and mutual learning, if necessary.

Examples illustrating the strategy proposed include educational projects developed with our immediate participation, from our own literature textbook to multimedia projects, in particular the one based on Ivan Goncharov's *Oblomov* for the Live Pages project and the one based on Leo Tolstoy's works as part of the Digital Tolstoy initiative.

Keywords

action-based learning, narrative-based learning, pedagogy of art, school literary canon, transmediality.

For citing

Arkhangelsky A. N., Novikova A. A. (2021) Transmediyny povorot v strategiyakh obucheniya: narrativnye praktiki na urokakh literatury [A Transmedia Turn in Educational Strategies: Storytelling in Teaching Literature to School Students]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 2, pp. 63–81. https://doi.org/10.17323/1814-9545-2021-2-63-81

Humanities subjects, literary studies in the first place, seek to achieve divergent goals in modern school education: teach a certain indispensable body of knowledge while at the same time instilling a love of reading, and evince the idea of cultural tradition while at the same time engaging students in modern reading practices.

Reading just anything out of interest alone means sacrificing cultural memory; even the most audacious curriculum designers only suggest changing the proportions by reducing the share of classic literary works and increasing that of modern literature.[1] At the same time, it is hard to develop a love for literature by studying the classic books, which were mostly written for adults and require life experience and a good sense of aesthetic distance. Meanwhile, any attempts to redistribute the knowledge component in a more balanced manner by increasing curriculum differentiation face resistance from some educational leaders, teachers, and parents.[2] They argue that cultural memory requires effort: if students are not acquainted with a certain body of literature — even if they cannot understand the plots and problems raised — they will never come back to it in adult life.

However, at least part of the problem resides in something else, notably in that cultural memory is perceived by its bearers as something predetermined, fixed, and rigid. Such an attitude has been quite a tradition. One of the pioneers of culture memory studies describes the past as "convolving into symbolic figures" [Assmann 2004:54]. At a certain moment, this past is canonized, "stopping the flow of the tradition" and freezing the memories [Ibid:100]. The metaphor of *transmitting* the idea of cultural tradition also implies that the idea is solid, complete, and "recorded". Another metaphor that is even more accurate in this sense is that of the literary "canon" [Bloom 2017; Vdovin, Leibov 2013; Sukhikh 2016; Pavlovets 2016], which is formed by the entire corpus of school classics and must be passed on like a baton from one generation to another.[3]

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[1] See the debate over the Literature Model Curriculum for Grades 10–11, in particular: Asonova E., Pavlovets M. (2016) Primernaya programma po literature. Dorozhnaya karta peremen [Literature Model Curriculum: A Roadmap for Change]. *Uchitelskaya Gazeta / Teacher's Newspaper*, March 2. http://www.ug.ru/article/908

[2] Such resistance was encountered by an attempt to distribute the whole corpus of texts among grades and reduce drastically the number of modern books in the new (third) version of the Federal State Education Standard (the adoption of which was eventually postponed), the Federal Institute of Pedagogical Measurements' project for measuring subject-specific learning outcomes by grades, and other initiatives.

[3] The debate on this topic embraces the whole spectrum of opinions from extreme left to extreme right, from Ivan Solonevich (Solonevich I. (1991) *Narodnaya monarkhiya* [People's Monarchy], Moscow: Feniks. Reprinted from: Solonevich I. (1973) Narodnaya monarkhiya [People's Monarchy], Buenos Aires: Nasha Strana) to Elif Batuman (Batuman E. (2018) *Besy. Priklyucheniya russkoy literatury i lyudey, kotorye ee chitayut* [The Possessed: Adventures with Russian Books and the People Who Read Them], Moscow: AST).

Translated from Russian by I. Zhuchkova.

Meanwhile, in our view, cultural memory these days is constantly transforming. Transmission is only possible in the form of live broadcast, where any scenario can go wrong and any small contingency will alter the system — this is how the Sochi Olympic ring fail has become a live broadcast meme.

The cultural tradition is constantly enriched with new cultural values, some of which arise "from nowhere", out of the blue, but become crucial factors of development over time. At the same time, it is affected by people's changing attitudes towards values of the past. Socially prevalent interpretations of familiar, "eternal" images, plots, and meanings are interrelated with the whole range of cultural practices, from politics and economics to new technologies and new daily habits. To pretend that this is not so means to set oneself up to inadequate decisions and the romantic yet archaic self-deceptive belief that nothing changes — so we can keep using the old methods and formats of schooling. This results in rejection and misunderstanding on the part of students, making it more and more challenging for them to understand the past.

Paradoxically, the main gravediggers of the school literary canon are those who support the rigid model where it is preserved and transmitted endlessly exactly as it is. By failing to consider the curvature of historical space and the effect of unstoppable transformation, they repeat the mistake of pre-revolutionary teachers of the Law of God, which was reduced to a catechism; as we know, the conflict between the objective at hand (transmission of a boring rigid set of doctrinal dogmas) and the mission (initiation in the deep and mysterious world of faith as such) was eventually resolved in favor of dogmatic teaching. The outcome of this experiment is well-known: dry rote learning for exams and a massive exodus from the church immediately after the revolution. There are, indeed, only two ways out of dogmatic teaching that has lost touch with the changing reality: sabotage or rebellion. Sabotage works as long as there are instruments of coercion — but as soon as they disappear, a change of social formation occurs through rebellion and revolution.

Problem Statement

We proceed from the assumption that, rather than sacrificing one of the two goals of teaching literature at school, a more complex model based on the presumption of reality should be constructed. The reality is that teachers *always* — regardless of whether curriculum differentiation is maintained or reduced or whether material is distributed among grades in compliance with national instructions and regulations or this right is retained by the teacher and textbook author — face the dilemma of "*ex post* modernization". They either sacrifice modern practices[4] and thus repel students from their subject [Borusyak 2018;

[4] Not to be confused with modern content; modern teaching practices can be ap-

2019], including the canon that they transmit, or become mediators between the participants in the cultural process, "old" (authors and experts who have become established figures in the public sphere) and "new" (schoolchildren who are only entering the public scene, even if their role is reduced to speaking in the classroom so far). The primary focus of this study is on the school subject of literature, but the above is likely to be true for the entire school curriculum. If teaching humanities subjects is approached from this perspective, then teachers as mediators should take into consideration a few distinctive features of modern culture that have a significant impact on the teaching process and on how school students perceive information.

Challenges of Modern Culture: The Scientific Premise

The increasing mediatization of culture is becoming a key factor of change. This refers not only to the digitization of cultural heritage. Indeed, facilitation of access to works of art, literature in particular, is extremely important. What is of no less importance, however, is that digitized cultural heritage goes online and becomes part of the "culture of flow" [Flichy 1991; Groys 2018]. As a result, both teacher and student find themselves in front of a giant "database" [Manovich 2018:270], which inevitably equalizes all the artifacts. On the Web, Leo Tolstoy's works can coexist on a virtually equal footing with contemporary literary fiction, such as video game novelizations — recognized by niche communities (and sometimes winning relevant literary awards) as well as blatantly amateurish or even illiterate.

In part, it has always been this way: in the late Soviet Union, a school student would read the conventional Sergei Yesenin alongside the unconventional Eduard Asadov, just as today's poetry lover can read Akh Astakhova, the most popular poetess on the Web, alongside not only Sola Monova, another star of Runet poetry, but also Anna Akhmatova herself. However, today's situation is essentially different in that the flow of "the unconventional" has grown so much that quantity has turned into quality and we have no effective ranking instruments left. In the Soviet era, propaganda and suggestion techniques were used, and a hierarchical view of the world was maintained. Today, we are dealing with an endless stream, denial of access to which would be technically impossible and ideologically wrong.

What is to be done? The answer to this classic question from the Soviet literary canon is not as simple as it seems to the supporters of rigidly top-down school education. Referring to Vissarion Belinsky's articles on the development of literary taste will not be enough, at least because Belinsky is not perceived as an unassailable authority by the new generations of readers. In this situation, it is equally useless and dangerous both to accept the unconditional refusal from aesthet-

plied to classics, just as dogmatic teaching practices can be applied to contemporary literature.

ic ranking and to bury one's head in the sand, pretending that nothing is going on.

Furthermore, not only does the Internet "flow" equalize works of art aesthetically, but it also eliminates any chronological boundaries. Oeuvres of the past and present are "temporally equalized", i. e. they exist in the human mind simultaneously. They live now and always, and they have little to do with the cultural contexts of their era. Homer may easily find himself competing against online fiction for the reader's attention. Furthermore, there is a phenomenon of *simulated cultural memory*, constructed by search engine settings that can be manipulated by search engine optimization (SEO) experts.

All of this might look awful to a bearer of a high cultural tradition, but this context should be taken into consideration — not accepted by putting oneself at the mercy of the "new logic", but *taken into consideration* — in order to ensure reasonable decision-making in education. However, today's school mostly prefers to ignore this context, being convinced that it retains the expert right to select and label literary works as "worthy" and "unworthy" of reading and studying [Bourdieu 2000], but also that the results of such selection and labelling will be accepted by students automatically as persuasive and even inherently sacrosanct. However, schoolchildren are acutely aware of the discrepancy between their aesthetic experiences and needs and the works and interpretations offered by the school [Asonova, Borusyak, Romanicheva 2020:169–170]. They are used to receiving information in small portions, with an essential audiovisual component. A large novel "locked" in a cover needs special ways of presentation: students should be provided with a climate that will boost their motivation to read it [Romanicheva 2020]. There is often a wide gap between the values and associated behavioral patterns of modern school students and those of protagonists from the school literature curriculum (modern readers with gaming experience tend to identify themselves much more with the protagonist than with the author). In this situation, teacher as mediator has to make much more effort and use advanced teaching techniques to adapt cultural heritage objects to the new cultural landscape and make them part of the next generation's cultural memory.

Another factor shaping the modern practices of cultural memory formation is the uneasy relationship of modern society with cultural hierarchy, artistic taste, and expert authority [Shapinskaya, Kagarlitskaya 2003]. Back in the earlier days, the teaching profession automatically placed teachers at a fairly high level in cultural hierarchy, obliging them to transmit the established ideas about the aesthetic value and at the same time allowing them to make value judgments about new cultural phenomena and readers' opinions. Today, the obligations remain — but the rights have been restricted dramatically. That is, they do exist formally, but they are not recognized "automatically" by a significant proportion of students and their parents. An example to illustrate this is the case of the classic big novels: we all agree that they

need to be read, but this need has to be proven to students to engage them, every time.

This situation is typical not only of schools but also of most official cultural institutions such as libraries, museums, and mass media. All of them, being part of the public sphere, find themselves on the boundary between the co-existing formal and informal zones [Novikova 2020]. For users switching randomly between the two, the opinion of an art critic has no more weight than that of a blogger, and the expertise of a museum curator with a history degree has no more value than amateurs' guesswork. There are opinion leaders in the informal zones of the public sphere whose expert judgments have a higher status. The more actively the formal public sphere refuses to recognize the informal one, the more likely the attitudes transmitted by such opinion leaders are to take root in personal and, in the long term, cultural memory. Unwillingness to discuss those attitudes and opinions with students and to engage in a dialogue with the informal reduces students' chances of meeting the tradition, not just modernity.

It can be said even today that the informal part of the public sphere (this role was played, for example, by rock culture, comics, and video games in the 20th century) has formed its own cultural memory, which cannot be evaluated only as subcultural [Fiske 1987; Jenkins 2019]. Its penetration into popular culture, and through it into the creative canon means that today it largely determines the cultural memory of the globalized world, coexisting with local cultural memories of different regions [Nora 1999].

Transmediality as a Learning Strategy

The growing level of schoolchildren's media literacy, manifested in their ability to search for necessary information on the Internet, promptly check the information offered by the teacher, and master new technologies and platforms even more promptly can also be considered a challenge for the modern education system. This is not only about plagiarism or the easiness of finding answers to teacher's questions online, although the problem does exist (it was exposed most dramatically in distance learning during the COVID-19 pandemic), or the fact that students can always find information on the Web that differs from the teacher's point of view and casts doubt on his/her competence, although it is a major challenge of modern culture — but also about understanding that we have long entered the age of transmedia, which shapes specific patterns of thinking and perception, imposing specific obligations on all participants in the process.

According to Professor Henry Jenkins, "a transmedia story unfolds across multiple media platforms, with each new text making a distinctive and valuable contribution to the whole" [Jenkins 2019:153]. Recent decades have seen a growing popularity of transmedia storytelling, the technique of telling a single complex story across multiple platforms and formats, e. g. by releasing a book, a movie, and a video game al-

most simultaneously. Meanwhile, the narrative is not reproduced literally across platforms: it evolves, allowing the audience to learn more about the transmedia "universe" such as Star Wars. To make it easier and more fun for the audience to dig into all the details of the narrative, storytellers combine different genres and use a wide range of techniques for emotional impact. Transmediality implies readiness of the audience for game modes of communication. Otherwise speaking, narrators provide their audience with diverse and personalized content adapted to different platforms and types of perception, create a high-quality multi-channel space for interaction, provide integrative links among different versions of the narrative, and update the information on a regular basis. Furthermore, they expect that the audience will not just consume passively the texts and audiovisual materials but will actively engage with those, communicate with one another and the storyteller [Ibid:153], and be willing to become co-creators.

As a result of the perceiver's participation and involvement in rethinking the characters' ambitions and values, a semantically and artistically "multilayer text" is formed, allowing all participants to be immersed in a common space of communication, aesthetics and, if necessary, mutual learning. According to Carlos Alberto Scolari, who analyzed transmedia storytelling from the perspectives of semiotics and narratology, a person needs not only to be able to read texts and interpret images but also to have a wide and diverse range of online communication skills to perceive transmedia narratives [Scolari 2009].

Transmediality, in its new technological incarnation, brings us back to the key principle of teaching literature in secondary school that was once formulated by Mariya Rybnikova [1929]: "From a little author to a big reader". A number of Soviet and later Russian teachers regarded regular creative tasks as a way out of the insoluble contradiction between transmission of the "canon" and involvement in reading, which was acknowledged at the beginning of this article.[5] By engaging school students in the process of creation and assigning them the role of "little authors", not only will we make it easier for them to understand the classic heritage and encourage their personality development, but we will also turn external into internal, thereby providing them with the opportunity to literally *internalize* classic literary works. This is exactly what can be achieved by means of transmedia storytelling using digital technology. However, technology remains only an instrumen-

[5] See the following guidance papers: Melik-Pashaev A., Novlyanskaya Z. Adaskina A., Nikitina A., Chubuk N. (2010) *Khudozhestvennaya odarennost' i ee razvitie v shkol'nye gody. Metodicheskoe posobie* [Artistic Giftedness and Its Development During the School Years: Teaching Guide], available at: https://www.pirao.ru/upload/iblock/9b0/hudozhestvennaya_odarennost.pdf; Troitskaya T., Petukhova O. (2012–2020) *Literaturnoe chtenie. (Uchebnik 1–4-go klassa)* [Literary Reading (Textbook for Grades 1–4)], Moscow: Moscow Center for Continuous Mathematical Education, Institute of New Technologies, available at: https://www.int-edu.ru/content/deti-chitateli-umk-po-literaturnomu-chteniyu-1–4; and others.

tal prerequisite, while the goal is to engage students in the narrative and promote their literary thinking.

Therefore, taking cue from Scolari, we consider it important to invest a lot of effort in developing transmedia literacy skills in modern school teachers and students. International research has identified media platforms that students from around the world use actively in their learning process, both for education and self-education purposes [Universitat Pompeu Fabra 2020]. However, reliance on these — as well as any other — findings should not be taken as a guarantee of success. Technologies and user practices are changing all the time. What is popular among today's adolescents will be perceived as obsolete by the youngsters of tomorrow. Teachers' unawareness or rejection of currently popular platforms and communication practices impairs mutual understanding between teachers and students and is sometimes perceived by the latter as disrespect for contemporary culture, with which they associate themselves. When teachers use exclusively platforms that they are used to, it is sometimes interpreted as orientation towards "friend or foe" modes of interaction.

Mastery of a wide range of transmedia literacy skills by teachers and students — audiovisual (including aural), digital etiquette, participatory competencies (including gamification), digital technology (in particular cross-platform capabilities), narrative (knowledge of popular culture narratives that are produced as films, TV series, video games, etc. as well as iconic characters and currently developing conflicts), etc. — can significantly facilitate the process of communication as such (both face-to-face and distance, synchronous and asynchronous), material internalization, and the formation of a cultural memory shared by different generations.

Today, the principles of transmedia storytelling are used in a variety of industries: politics, marketing, psychology, arts, etc. [Freeman, Gambarato 2019]. They have been used in education, too [Tarcia 2019]. However, recent Russian studies assessing teachers' readiness to effectively use new platforms and media technology opportunities in distance learning showed that, although Russian teachers exhibit a fairly high level of digital literacy, their skills and techniques are pretty straightforward. Normally, they prefer using learning platforms with pre-made content [Laboratory for Media Communications in Education of the Higher School of Economics 2020], failing to utilize the entire range of media and formats available to modern students and to promote the entire set of modern transmedia literacy skills listed above. Moreover, they are often strongly recommended to do so by school administrators. That is to say, the emergency transition to distance learning did not become the next step on the school's way towards a "participatory culture" [Jenkins 2019:29], where users are invited to contribute to the production and distribution of new content. In case of the learning process, one can also speak of new knowledge, using the term of Pierre Lévy, who understood approximately the same by his "knowledge cul-

ture" [Lévy:237] as Jenkins meant by his "participatory culture". According to Lévy, the knowledge that participants acquire as a result of interactions within self-organized groups of individuals sharing a common goal forms the so-called collective intelligence, which is crucial for the development of collective and cultural memory.

Narrative Method in Teaching Literature

So, the balance of tradition and modernization can be achieved or at least essentially facilitated by using transmedia learning strategies. Such a solution is equally opposite to "preservation" and "destruction" and is equally far from idealizing the current state of culture and from ignoring it. It allows working with cultural memory not as a solidified object but as an ever-changing subject by using digital skills to expand the experience of cultural inheritance. When approached properly, it does not divide generations but brings them together.

Above, we analyzed the transmedia storytelling strategy and the set of new digital skills and cultural practices required to interpret transmedia stories. In this section, we will focus on narrative literacy as one of the most important components of transmedia literacy in literary studies.

Learning to use a variety of platforms alone is not a response to the challenges of modernity and modern education. Technology helps those who understand clearly how to use the new opportunities to solve new problems or old problems in new contexts. In this case, since the subject of this study is literature education, we will take cue from Scolari and go by the concept of narrative, i. e. stories about people and life situations in which they find themselves.

To make it easier to understand the proposed transmedia learning strategy, let us define its place among other teaching approaches. We consider the transmedia learning strategy to be a variation of constructivism. The latter is quite popular in both traditional education and e-learning and serves as a building block in activity and active learning theories [Mayes, de Freitas 2005; Andrews 2011; Pange, Pange 2011].

The narrative method as part of the transmedia learning strategy is regarded here as a tool that can help modern school students bridge the gap between literary classics and modern life with its problems.

Narratives and archetypal plots have already been used in teaching for quite a while. They allow the reader to see in literary works the eternal problems that have worried people across eras and the different motivations of characters in the face of similar dilemmas. For instance, the narrative of travel — both as a literary genre and as a metaphor of life journey — became a fundamental principle of selecting texts and reading assignments for the 7th-grade literature textbook edited by one of the authors of this article.[6] Inside the book, the *Odys-*

[6] Arhangelsky A., Smirnova T. (2020) *Literatura: 7 kl. V 2 ch. Uchebnik* [Literature: 7th Grade Textbook, in Two Volumes], Moscow: Drofa.

sey is rhymed with *Christmas Eve* by Nikolai Gogol, *Gulliver's Travels*, Afanasy Nikitin, *The Hobbit, or There and Back* by John Ronald Reuel Tolkien, and *Homesickness* by Marina Tsvetaeva.

Searching for analogies and associations is possible not only on the basis of genre or plot similarities. For example, when developing creative assignments based on Ivan Goncharov's novel *Oblomov* for the Live Pages project[7] and preparing video lectures,[8] teachers were advised to rely on a wide range of cultural and historical connections in their conversations with students. Comparison of *Oblomov* characters with those of Gogol's *Dead Souls*, old-world landowners, and ancient mythological figures allows emphasizing their archetypal and timeless nature.

The transmedia learning strategy uses the same principle by which very different works complement and continue one another, but it also proceeds from the principles of co-participation and joint digital creative efforts of students and teachers. We believe that the use of transmedia storytelling in teaching the humanities allows implementing the principles of humanistic education, which are gaining even more relevance in the 21st century [Adamsky et al. 2015].

Not only does the narrative method, which underlies creative tasks, allow offering students a set of "canonical stories" from fictional biographies, but it also turns learning assignments into a "laboratory of life" described by the authors of the Humanistic Education Manifesto [Adamsky et al. 2015].

Reproduced from century to century, from one literary work to another, dramatic collisions and their changing interpretations and perceptions teach the reader to see the past as well as the uncertainty typical of modern societies not as a threat, but as a driver of curiosity. By allowing students to choose media platforms that they find convenient or suitable for their specific research or creative inquiry needs, the transmedia learning strategy encourages their self-determination and makes it possible for the teacher or tutor to actualize the idea of individual learning trajectories.

To illustrate, let us consider the assignment for Goncharov's *Oblomov*, where students are asked to find present-day equivalents of outdated cultural practices described in the novel. It may be not only mechanical replacement of such practices, e. g. Olga Ilyinskaya's traditional album vs. a VKontakte profile, but also various manifestations of the important cultural need of an individual to express their feelings (often the same across different eras) and their inner world through

[7] A joint initiative of Rosuchebnik (Russian Textbook) Corporation, Live Pages Project, and Samsung Electronics: https://www.samsung.com/ru/livepages/

[8] Alexander Arkhangelsky. *Live Pages: The Novel 'Oblomov' in Literature Textbooks*. Five lectures: https://www.youtube.com/playlist?list=PLPCZa4Drmlmjchnf-GY8oSBzIyN-mdw9h1&fbclid=IwAR0p-7lraYZZ2a6slEBQLCWEW9JqnJREtUWovV_cjMK3n8U9oA7zzBdurXw&app=desktop

their own or someone else's artwork: a set of texts (poems), images (paintings or photos), musical works, etc.

Reflecting on a topic, students can create their own "albums" on open media platforms, capturing the sentiment of a particular era or the mood of a certain character.[9] The teacher, when discussing such albums with the class, can draw students' attention to how different writers use album descriptions to give the reader clues about characters' personality and ulterior motives. Hopefully, the teacher will be able to engage students in the interpretation of creative devices used by the writer — or artist/director, in case not only the text but also its illustrations or film adaptations are discussed. This way, a creative task becomes sort of an essay on the topic, a digital continuation of the narrative, the discussion of which began in video lectures and has been sustained by the teacher.

Another way of using the narrative method in teaching is immersion in a literary work as in the "universe" of a TV series or video game. Of course, a classic novel by itself does not offer opportunities for interaction. However, it can be perceived as the core of a transmedia narrative, where the teacher and students play the role of directors, filming certain parts of the novel with the use of various storytelling formats such as Instagram stories, Screenlife,[10] etc.

We used this approach in working with Higher School of Economics Master's degree students, which resulted in the Students to Tolstoy project.[11] In this case, studying the literary work in the way that it is required in school was not our objective. Yet, we certainly expected this project to become a tool for the formation of cultural memory in students and other young visitors of the website. Technological platforms gave students the opportunity to "comment" on *War and Peace*, *Resurrection*, and *Sevastopol Sketches* using interactive maps, a recipe e-book, an audio guide, and other means. All of these multimedia tools are easy to use and accessible to schoolchildren. Thanks to them, students can "follow the trail" of characters, internalize their thoughts and emotions better by overcoming the cultural gap, and approach the writer's complex philosophical ideas through such internalized experiences. In this regard, tasks that could be offered to Master's degree students and schoolchildren differ only in the degree of com-

[9] See, for example, "Onegin's Albums" on Instagram, created by a student of Poliforum, Yekaterinburg Lyceum no. 180 (teacher Alexander Moiseev), with the use of the already existing "profiles" of Olga and Tatyana: https://www.instagram.com/evgeniy.onegin.official/?igshid=ohuss81grjb4&fbclid=IwAR30GPmHU18TV78S5xqVP2tEA4O299iPBKjBh5A__eEPHAoLunPEh254lAs

[10] Videos or movies in which everything the viewer sees happens on the computer, tablet, or smartphone screen.

[11] The Students to Tolstoy project was created by HSE Master's Degree students in Multimedia Journalism as part of the Digital Tolstoy Initiative. Project managers: Alexander Arkhangelsky, Fyokla Tolstaya. http://tolstoy.ru/projects/students/

plexity and the popularity of specific formats in a certain age group. By asking students to create and deliver a virtual museum story (museum storytelling) around a classic or local author, teachers engage them and enhance their motivation for reading.

Naturally, to engage in such gamelike transmedia interactions with a literary text, both the teacher and students must be able, according to Scolari [Scolari 2009], to interpret discourses and use narrative devices across different media platforms. This is exactly what the University of Tartu's Department of Semiotics researchers are guided by in their teaching methods [Ojamaa et al. 2019; Milyakina 2018] within the framework of similar approaches.[12]

Of course, transmedia adaptations of a novel will not be equivalent to the novel itself, and will hardly even have the same cultural value as a good film adaptation — the practice that has already been used in teaching. Yet, they help school students focus on the book and think about the characters' behavior with less detachment, imagining them as storytellers on some media platform. A story based on a literary work and translated into the language of modern media may increase the level of student involvement and immersion in the problems raised in the book.

And again, this is not self-sufficient progressivism but development of the tradition of creative tasks and their translation into the language of modern practices. Fanfiction (fictional writing created by fans based on existing iconic works of fiction) is no worse than conventional school theater at drawing students into the literary and historical materials and feeding their willingness and motivation to dig into literary scholars' works so as to enrich their stories with geographical and lifestyle details that were not disclosed by the original writer, whose target audience was his/her contemporaries. Most importantly, the outcome is exactly "from a little author to a big reader". School students are invited to enter the world of literature via the familiar doors of multimedia, visualization, audio culture, gamification, and fandoms, but they are led towards the most essential: the text and the narrative.

Results and Conclusions

Of course, a one-time use of such transmedia adaptations in teaching can be perceived by students as entertainment. However, the larger and the more diverse the array of narratives and forms that students come up with, the stronger those narratives will connect with one another into a single transmedia story, the more opportunities for interaction students will have, and the deeper they will be able to immerse

[12] Online course 'Literature on the Screen: Three Lessons about the Amazing Transformation of Andrus Kivirähk's Book *Old Barny aka November* into Rainer Sarnet's Movie *November*. Theory, Games, and Assignments: http://november.haridusekraanil.ee/?fbclid=IwAR3vKgJGi7Il1Za9aqSXRIXkwRbxJQCsOGaDnJeC-adzKw3SYJyR3zGs5vno

into the universe of a large and complex literary work (such as *War and Peace*) or that of a specific writer, in which a series of works make up a single narrative (such as Ivan Turgenev's novels).

The narrative method and transmedia learning strategy allow school students not only to make use of the cultural and technological skills that they are currently especially good at, but also to learn new skills and competencies from one another within their project teams as well as to teach those to their teachers, which will also have a positive impact on the educational process.

The transmedia learning strategy will make it possible to organize work with students of different levels by allowing everyone to do their individual jobs within a common assignment and taking into consideration students' personal characteristics, i. e. not slowing down the fast and active learners and not speeding up the slow ones.

Of course, the constructivist approach that this study investigates has its peculiarities, in particular labor-intensive instructional design and challenges in assessment. In case of using transmedia storytelling, however, these problems are partly mitigated by the fact that students create most of the learning content themselves. This content remains on multimedia platforms, allowing teachers to develop the project further with the next cohort of students as well as to involve high school students in teaching elementary school pupils, which provides mutual benefits and an opportunity to create a large-scale project accessible to external users, aimed at not only education but also literature popularization. In this case, the teacher switches between the roles of mediator and tutor/facilitator, which requires adopting a curator perspective on contemporary culture [Bhaskar 2017].

Publicness and continuity of such projects create additional motivation for students, becoming an important part of their digital portfolio and allowing them to enter the public sphere and connect with adult researchers and producers of online educational projects even before they graduate.

To summarize, the ideas of this study make it possible to use digital media theory in educational sciences without focusing too much on hardware, software, and access to information but rather using media theory and practices in instructional design.

This article was supported by Grant 19–29–14155 "The Subject of Literature and the Digitalization of Secondary Education: From Analog Thinking to Transmedia Art" of the Russian Foundation for Humanities.

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The Key Issues in Implementing the Federal State Education Standard for Preschool Education

Results of the National Survey of Preschool Education Quality in 2016–2017

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Received in September 2020

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Abstract

The article provides an overview of modern theories of preschool education quality from across the world. Quality assessment is discussed as a methodological problem: in terms of finding a balance between measurability of assessment criteria and their significance for preschoolers' learning, and between the amount of resources invested and the quality of data obtained. Results of the first large-scale independent investigation of preschool education quality in Russia are analyzed. During a structured observation, specially trained experts analyzed the organization and functioning of preschool classrooms. The study made use of the Early Childhood Environment Rating Scale®, Revised (ECERS-R), which had been validated for use in Russia. The following parameters were assessed: space and furnishings, personal care routines, language-reasoning, activities (learning, free play, experiments, arts, etc.), interaction, program structure (schedule and distribution of time among activities; formats of activities), and provisions for parents and staff. Data collected over two years allows not only identifying the achievements and deficiencies of preschool institutions involved in the study (n=1,357) but also analyzing the changes in education quality across 367 preschool classrooms and making assumptions about the reasons for those changes. Research findings can be used to improve the strategy of preschool education system development, the quality of preschool education programs, and the system of professional training and development for preschool teachers.

Keywords preschool education, quality assessment, learning environment, ECERS, national study of education quality.

For citing Shiyan I. B., Le-van T.N., Shiyan O. A., Zadadaev S. A. (2021) Klyuchevye problemy realizatsii FGOS doshkol'nogo obrazovaniya. Rezul'taty Vserossiyskogo issledovaniya kachestva doshkol'nogo obrazovaniya 2016–2017 gg. [The Key Issues in Implementing the Federal State Education Standard for Preschool Education. Results of the National Study of Preschool Education Quality in 2016–2017]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 2, pp. 82–106. https://doi.org/10.17323/1814-9545-2021-2-82-106

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Factors and Routes of Interregional Migration of University Graduates in Russia

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Received in September 2020

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Abstract

Data from Russia's Federal Monitoring of University Graduate Employment portal is used to analyze migration of youths between 2013 and 2015. Interregional mobility of human resources stems, in particular, from uneven distribution of universities across the country and socioeconomic disparities between regions. Migration of university graduates may deprive some regions of much of their skilled workforce. The largest migration flows are observed between Moscow, St. Petersburg, and Moscow Oblast. Apart from federal cities, graduates are also attracted by industrial regions of the Russian North.

This study makes use of a modified gravity model that includes various socioeconomic indicators of home and recipient regions in addition to the basic gravity model factors. Gravity modelling allows identifying a number of migration factors associated with the areas of origin and destination. "Push" factors (the ones that repel graduates out of the region) include low wages and high rates of poverty and unemployment. "Pull" factors (the ones that attract graduates into the region) are represented by high wages and high levels of cultural development and innovative activities. Most often, university graduates migrate from south to north and from east to west. Federal subjects of Russia differ essentially by the demand for graduates in regional labor markets. Analysis reveals which regions of Russia attract or repel recent graduates. Territories with consistently diminishing populations of skilled professionals are in urgent need for dedicated programs to attract recent graduates from other regions, new high-performance jobs, and improvements in the quality of life.

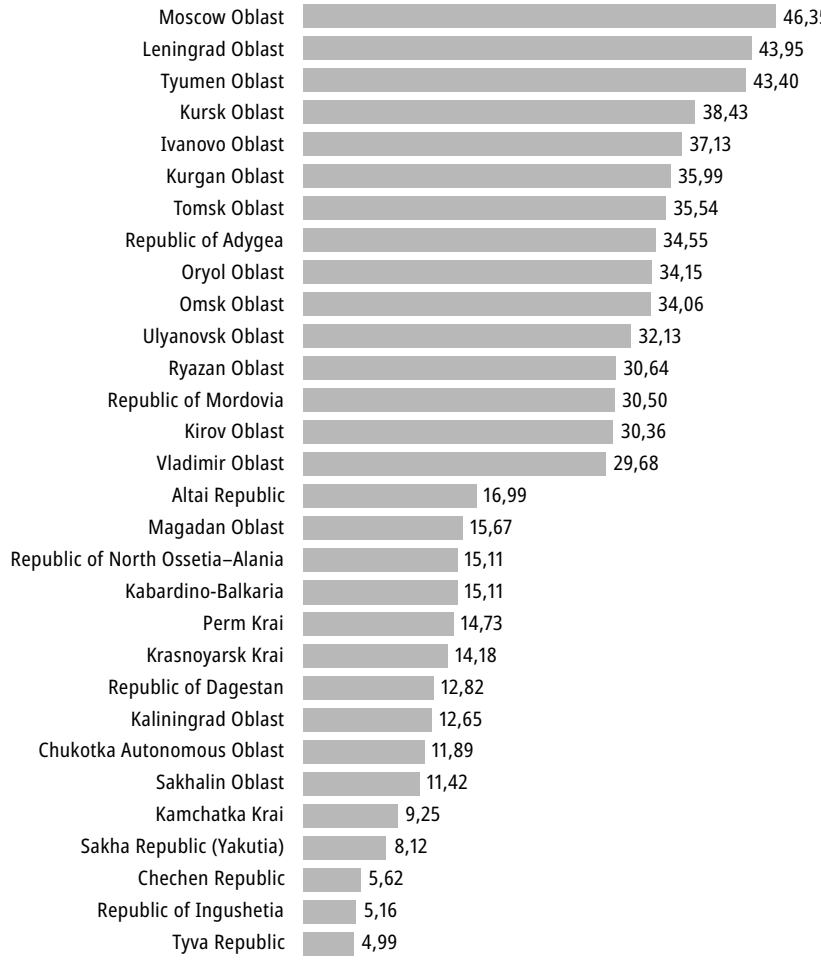
Keywords

graduate employment, migration, modified gravity model, regions of Russia, university graduates.

For citing

Antosik L. V., Ivashina N. V. (2021) Faktory i napravleniya mezhregional'noy migratsii vypusknikov vuzov v Rossii [Factors and Routes of Interregional Migration of University Graduates in Russia]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 2, pp. 107–125. https://doi.org/10.17323/1814-9545-2021-2-107-125

Figure 1. **Average interregional out-migration rates for university graduates in 2013–201.,** %



Source: Complied based on the data from the FMUGE portal: http://vo.graduate.edu.ru

Employability of university graduates in the labor market is a major predictor of regional and national development. It serves as an indicator of efficiency of investments in education, which are heavy at both private and public funding levels.

The territory of Russia is extremely heterogeneous in terms of the distribution of universities and, consequently, university graduates. Apart from Moscow and St. Petersburg, the highest number of students per 10,000 population is observed in Tomsk, Tyumen, and Omsk Oblasts and the Republic of Tatarstan.[1] Job opportunities for university

Translated from Russian by I. Zhuchkova.

[1] Federal State Statistics Service (Rosstat) (2017) *Sotsial'no-ekonomicheskie pokazateli* [Socioeconomic Indicators], Moscow: Rosstat.

graduates and the level of regional labor market development also differ a lot from region to region, promoting interregional youth migration. According to the Federal Monitoring of University Graduate Employment (FMUGE) portal,[2] over 25% of Russian university graduates migrate within one year after graduation. In 2014, graduate migration rates varied from 8 to 57% across regions [Kozlov, Platonova, Leshukov 2017]. Over 35% of all graduates of universities in Moscow, Leningrad, Kursk, Ivanovo, Kurgan, and Tomsk Oblasts migrate to another region. Figure 1 shows regions with the highest and lowest out-migration rates for university graduates.

The main problem of post-graduation migration is that regions may lose much of their skilled workforce. Between 2013 and 2015, the number of regions with negative net migration (the difference between immigration and emigration) increased from 42 to 48 out of 83 regions (according to the 2013–2015 statistics from the FMUGE portal). Therefore, most regions are losing well-educated youth. The drain of recent graduates is expected to increase interregional disparities in economic development. This study seeks to analyze the factors and routes of migration of Russian university graduates.

The article is structured as follows: Section 1 offers a review of literature on migration processes; Section 2 describes research data and methods; Section 3 examines the results of assessing the factors of youth migration in Russia; Section 4 provides an analysis of university graduates' migration routes; and the final section sums up the findings and draws conclusions.

1. Factors of Migration

According to classical theory of migration, migration flows are affected by a number of factors associated with the area of origin or destination [Lee 1966]. Factors of origin, or "push" factors, are dominated by the economic (high unemployment, low wages, heavy taxation), social (high poverty rate), political (instability), and climatic (unattractive climate) motives. Immigrants are attracted by countries and regions with high levels of economic development, high wages, and accessible labor markets. Within the framework of the microeconomic model of individual choices [Todaro, Maruszko 1987], migration decisions are based on the analysis of costs and benefits associated with migration.

Individual migration propensity is largely contingent on the individual's phase of life: migration trends differ essentially between young adults [Winters 2011; Sage, Evandrou, Falkingham 2013] and older generations [Raymer, Abel, Smith 2007; Stockdale, MacLeod 2013]. In Russia, economically active population migrates to regions with high wages and strong industrial sectors: Northwest Russia, Siberia, and Far East. Senior citizens prefer regions with an attractive climate and a low cost of living [Mkrtchyan, Vakulenko 2019].

[2] http://vo.graduate.edu.ru

In a number of countries including Russia, youth migrants comprise a significant proportion of migration flows. Youth migrants can be divided into two key groups differing in the factors and routes of migration: school graduates and university graduates. A recent study found that university students (age 17–21) prefer to migrate to Moscow and Moscow Oblast, St. Petersburg and Leningrad Oblast, as well as Novosibirsk, Tomsk, and Voronezh Oblasts [Kashnitsky, Mkrtchyan, Leshukov 2016]. Central and southern regions of European Russia as well as Khabarovsk and Krasnoyarsk Krais also rank high on the scale of attractiveness to academic migrants.

Analyzing the factors of youth migration, researchers usually underline the role of regional economic development [Ciriaci 2014] and labor market conditions [Varshavskaya, Chudinovskikh 2014; Buenstorf, Geissler, Krabel 2016; Kozlov, Platonova, Leshukov 2017]. High unemployment and low wages encourage recent graduates to move to other regions. As high-skilled workers, university graduates attach a lot of importance to regional innovative activities [Marinelli 2013]. Quality of life and cultural development can also matter a lot when making migration decisions [Ciriaci 2014; Varshavskaya, Chudinovskikh 2014; Weisser 2018].

Job mobility patterns of university graduates in Russia are analyzed using the data on the FMUGE portal. In particular, this data was used to assess the demand for regional universities and examine the geography of university graduate employment in 2014 [Kozlov, Platonova, Leshukov 2017] as well as to model migration of Russian university graduates while taking into consideration the impact of neighboring regions [Antosik, Ivashina 2019]. The latter study zeroed in on the economic characteristics of regions, leaving social, infrastructural, and other factors of migration beyond the scope of analysis.

Research on the relationship between higher education and regional labor markets is most often based on university graduate surveys conducted by the Federal State Statistics Service (Rosstat) [Varshavskaya, Kotyrlo 2019; Cherednichenko 2020]. Parameters analyzed include the dynamics of supply of and demand for graduate labor, general characteristics of graduate employment, the dynamics of graduates' wages, and industry-specific differences in labor remuneration [Lopatina et al. 2020].

Therefore, the available literature pays little attention to analysis of the routes and factors of migration of recent graduates in Russia, and Rosstat statistics do now allow analyzing the migration flows of population with university degrees. These are the aspects that the present study focuses on in a quest to fill the gap in youth migration research.

2. Research Data and Methods

Analysis of graduate migration flows is based on the results of the FMUGE, published on a dedicated portal and representing aggregate data from universities, the Federal Service for Supervision in Educa-

tion and Science (Rosobrnadzor), and the Pension Fund of the Russian Federation. There are a number of limitations to this data. First, it provides no information on international and intraregional migration, so this study deals with interregional migration of graduates only. Second, this database features only registered addresses of employers, which may result in overstated migration rates for some regions, first of all Moscow, Moscow Oblast, and St. Petersburg. Third, graduate employment rates may be underreported in some career fields, such as law, due to specific aspects of employer affiliation practices. Fourth, the available data contains no information on graduates' actual place of residence, restricting analysis to migration from the region of graduation to the region of employment. However, there are no other databases reflecting university graduate migration and employment during the period analyzed.

Matrices of interregional youth migration were constructed using the FMUGE data. Migration statistics on the portal are only available for the 2013–2015 graduates who got employed within a year after graduation. Additionally, Rosstat data[3] on regional socioeconomic development was analyzed. The sample comprised 83 regions of the Russian Federation.[4]

The following regional indicators reflecting graduate migration were calculated:

- Ratio of graduate in-migration to economically active population (per 1,000 population);
- Graduate net migration, i. e. the difference between graduate in-migration and out-migration (persons) (Figure 2);
- Ratio of graduate net migration to economically active population (per 1,000 population);
- Proportion of graduate out-migrants in total graduate population (%);
- Ratio of graduate out-migration to economically active population (per 1,000 population);
- Migration flow from home region *i* to recipient region *j* (persons).

Judging by net migration rates, university graduates are attracted the most to federal cities, Moscow Oblast, and industrial regions. Negative net migration is typical of the southern regions of European Russia, Siberia, and Far East. Table 1 displays the leading and outsider regions by graduate migration indicators.

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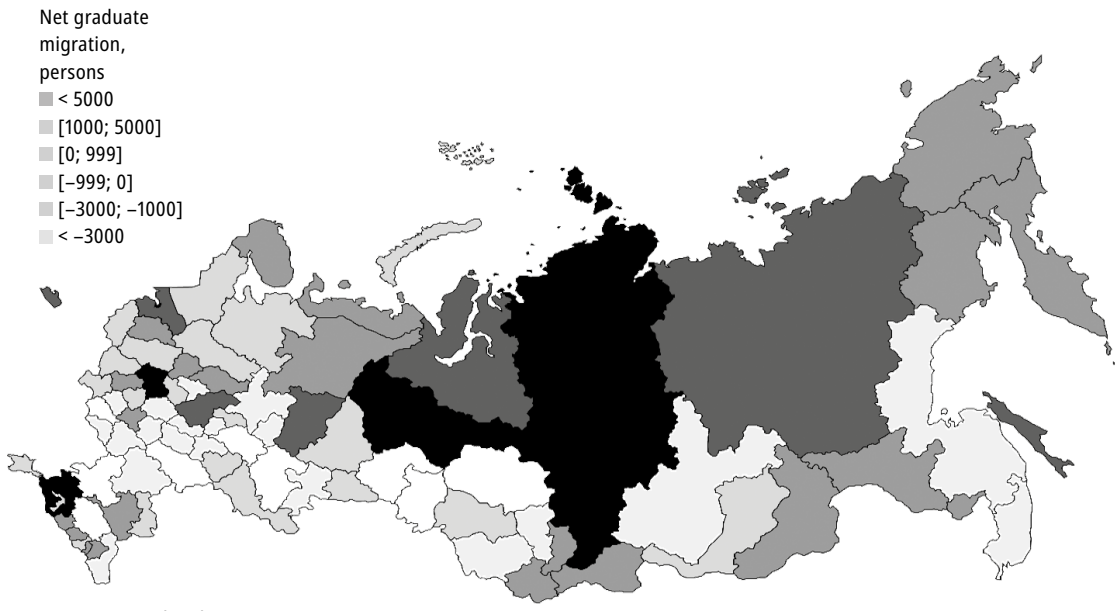
[3] Rosstat (2017) *Regiony Rossii. Sotsial'no-ekonomicheskie pokazateli* [Regions of Russia: Socioeconomic Indicators], Moscow: Rosstat.

[4] Federal cities are analyzed separately from their regions; Yamalo-Nenets and Khanty-Mansi Autonomous Okrugs, from Tyumen Oblast; and Nenets Autonomous Okrug, from Arkhangelsk Oblast. Crimea and Sevastopol are excluded from analysis due to the lack of data.

Figure 2. **Migration attractiveness of Russia's regions to university graduates, calculated on the basis of 2013–2015 net migration rates.**



Source: Created with mapchart.net using the data from the Federal Monitoring of University Graduate Employment (FMUGE) portal (http://vo.graduate.edu.ru).

Note: Data on the Republic of Crimea for 2013–2015 is not available.

Regions attractive to university graduates include Moscow, Khanty-Mansi Autonomous Okrug–Yugra, and Krasnoyarsk Krai, while Tyumen, Tomsk, Omsk, Kursk, and Ivanovo Oblasts turned out to be losing young adults with higher education degrees (Table 1). Descriptive statistics for graduate migration variables are given in the Appendix.

Quite expectedly, the largest migration flows are observed between Moscow, St. Petersburg, and Moscow Oblast (Table 2).

On the macrolevel, migration process modelling is based on gravity models (for specific aspects of evaluation of gravity models and an overview of their advantages and disadvantages, see [Shumilov 2017]). Gravity modelling implies that intensity of the migration flow between two regions is related positively to the size of both regions and negatively to the distance between them. Gravity models have already been used for analysis of migration processes in Russia (e. g. in [Vakulenko 2015; Moskvina 2019]).

A review of Russian and international literature on youth migration shows that significant factors considered when making migration decisions include regional economic and cultural development, labor market situation, innovative activities, and quality of life.

The method used in this study has already been applied to measure interregional mobility in Russia [Andrienko, Guriev 2004]. In addition to the basic gravity model factors (region size and distance between regions), the modified gravity model used here includes various

Table 1. **Leading and outsider regions of Russia by graduate migration indicators.**

	Ratio of graduate in-migration to economically active population	Ratio of graduate net migration to economically active population	Proportion of graduate out-migrants in total graduate population	Ratio of graduate out-migration to economically active population
Leaders	Yamalo-Nenets Autonomous Okrug, Nenets Autonomous Okrug, Khanty-Mansi Autonomous Okrug–Yugra, Moscow, Krasnoyarsk Krai	Yamalo-Nenets Autonomous Okrug, Nenets Autonomous Okrug, Khanty-Mansi Autonomous Okrug–Yugra, Krasnoyarsk Krai, Chukotka Autonomous Okrug	Tyumen, Kursk, Moscow, Leningrad, and Tomsk Oblasts	Tyumen, Kursk, Tomsk, Oryol, and Ivanovo Oblasts
Outsiders	Ivanovo, Kursk, and Omsk Oblasts, Primorsky Krai, Republics of Mordovia and Dagestan, Altai Krai	Tomsk, Tyumen, Kursk, Ivanovo, and Oryol Oblasts	Kaliningrad Oblast, Sakha Republic (Yakutia), Kamchatka Krai	Sakha Republic (Yakutia), Sakhalin Oblast, Kamchatka Krai

Source: Based on the data from http://vo.graduate.edu.ru

Table 2. **The largest graduate migration flows in Russia** (graduates per year).

Route	2013	2014	2015
From Moscow to Moscow Oblast	18,187	15,361	14,043
From Moscow Oblast to Moscow	7,422	8,413	9,014
From St. Petersburg to Moscow	5,072	4,567	4,736
From Tyumen Oblast to Khanty-Mansi Autonomous Okrug	4,210	3,538	2,517
From St. Petersburg to Leningrad Oblast	3,894	3,268	3,489
From Moscow to St. Petersburg	3,514	4,353	4,470
From Rostov Oblast to Krasnoyarsk Krai	2,677	2,540	2,645

Source: Compiled using the data from http://vo.graduate.edu.ru.

socioeconomic indicators of home and recipient regions, such as levels of economic, entrepreneurial, cultural, and ICT development, situation in the labor market, healthcare, and innovative activities (Table 3). Region size is expressed in the model through graduate population as the main source of migration. Descriptive statistics for the indicators analyzed are given in the Appendix. Migration flow from home region (*i*) to recipient region (*j*) is used as the dependent variable in the models. Regressions are based on cross-sectional and panel data on 83 regions for the period from 2013 to 2015.

Model specification for cross-sectional data is described by equation (1); for panel data, by equation (2):

Table 3. **Socioeconomic characteristics of regions.**

Factor	Indicator
Regional economic development	Gross Regional Product (GRP) per capita, rubles
	Poverty rate (the proportion of population living below the poverty line), %
Labor market situation	Ratio of average wages to the cost of the minimum expenditure basket (hereinafter "wages"), fraction
	Unemployment rate,%
	Average time to find a job, months
Entrepreneurial development	Small businesses per 10,000 population
Environmental conditions	Air pollutant emissions by stationary sources, thousand metric tons
Cultural development	Annual theater attendance per 1,000 population
Living conditions	Floor area per person, m^2
Healthcare	Infant mortality rate (the number of deaths per 1,000 live births of children under one year of age)
Innovative activities	Business innovation activities,%
ICT development	Personal computers per 100 employed people

$$(1)\quad \ln M_{ij} = \alpha + \beta \ln Vyp_i + \theta \ln Vyp_j + \sum_{k=1}^{R} \gamma_k \ln X_{ki} + \sum_{k=1}^{R} \delta_k \ln X_{kj} - \mu \ln D_{ij} + \varepsilon_{ij};$$

$$(2)\quad \ln M_{ijt} = \alpha_{ij} + \beta \ln Vyp_{it} + \theta \ln Vyp_{jt} + \sum_{k=1}^{R} \gamma_k \ln X_{kit} + \sum_{k=1}^{R} \delta_k \ln X_{kjt} + \varepsilon_{ijt}.$$

where M_{ij} is migration flow from region i to region j, Vyp_i, Vyp_j is the number of university graduates in home/recipient region, X_{ki}, X_{kj} is socioeconomic factors of home/recipient region, D_{ij} is straight line distance (km) between the administrative centers of regions i and j, γ_k and δ_k are coefficients for the explanatory variable "socioeconomic factors of the home/recipient region", β and θ are coefficients for the variable "the number of university graduates in home/recipient region", μ is the coefficient for the variable "straight line distance (km) between the administrative centers of regions i and j", ε_{ijt} is random error, α_{ij} is the intercept of the regression equation, and R is the number of regional characteristics.

All the variables were log-transformed and the fixed-effects method was used to estimate the gravity model. Since migration flows from some regions are zero (about 35% of all observations), models with non-zero observations were estimated additionally. Zero migration flows, i. e. the absence of interregional graduate mobility, are characteristic of poor and/or mutually remote regions.

3. Results of Migration Factor Assessment

Because there is interaction between regional economic development (GRP per capita and poverty rate) and labor market parameters (average wages, unemployment rate, and average time to find a job) as possible explanatory variables, different versions of models were assessed. Distance between regions is a time-constant factor, and fixed-effects models do not allow identifying the coefficients for such variables. For this reason, cross-sectional data was used to measure the impact of this factor on graduate migration flows. The coefficient for the variable "distance between regions" is negative (–0.9) and statistically significant (at the level of 1%), which is quite consistent with the gravity model assumption that migration flows reduce as the distance between regions increases.

Table 4 presents the results of panel data modelling. The final choice of model was made using the within R-squared value, the Akaike Information Criterion (AIC), and the Bayesian Information Criterion (BIC).

The population of university graduates in home region has a significantly positive impact on migration flow. This is a basic factor of the gravity model. Among the "push" factors, high levels of significance are observed for average wages (the lower the wages, the higher out-migration) and poverty and unemployment rates (the higher the rates, the more graduates leave the region). Recent graduates are "attracted" by high average wages, low levels of entrepreneurial development, and high levels of cultural development. Healthcare, environmental conditions, innovative activities, and the level of ICT development are insignificant for the total sample (Models 1 and 2 in Table 4).

When zero observations are excluded from analysis (Models 3 and 4 in Table 4), it becomes clear that ICT development and innovative activities enhance region attractiveness. However, the impact of average wages and rates of poverty and unemployment on migration flows remains unchanged.

GRP per capita and average time to find a job are statistically insignificant in all the models. Moreover, these factors decrease model quality, so they are not included in the final version.

To rank the model factors by their influence on migration flows, standardized coefficients are calculated by multiplying the regression coefficients by the standard deviation of the relevant factor and by dividing it by the standard deviation of the dependent variable. Ranking of indicators by their standardized coefficients (from high to low) yields the following order:

1) Basic factors (distance between regions and population of graduates in home region);
2) Regional economic development (average wages and poverty rate);
3) Labor market situation (unemployment rate in home region);
4) Cultural development;

Table 4. **Results of panel data modelling. Dependent variable: migration flow of university graduates from home region *i* to recipient region *j* (persons)**

Variable	All regions		Non-zero observations	
Model	(1)	(2)	(3)	(4)
Population of graduates *i*	0.35*** (0.025)	0.34*** (0.025)	0.77*** (0.04)	0.74*** (0.04)
Population of graduates *j*	–0.005 (0.025)	–0.02 (0.025)	–0.04 (0.03)	–0.05* (0.03)
Average wages *i*	–0.59*** (0.13)		–0.78*** (0.17)	
Average wages *j*	0.30** (0.13)		0.37** (0.17)	
Poverty rate *i*		0.27*** (0.07)		0.26*** (0.09)
Poverty rate *j*		0.01 (0.07)		0.03 (0.09)
Unemployment rate *i*	0.19*** (0.04)	0.15*** (0.04)	0.12** (0.06)	0.06 (0.06)
Unemployment rate *j*	–0.06 (0.04)	–0.07 (0.04)	0.03 (0.05)	0.03 (0.05)
Cultural development *i*	0.05 (0.04)	0.11*** (0.04)	0.006 (0.06)	0.06 (0.06)
Cultural development *j*	0.11*** (0.04)	0.09** (0.04)	0.21*** (0.05)	0.21*** (0.06)
Small businesses *i*	0.04 (0.03)	0.05* (0.03)	0.05 (0.04)	0.06 (0.04)
Small businesses *j*	–0.08** (0.03)	–0.09*** (0.03)	–0.09** (0.04)	–0.11*** (0.03)
Living conditions *i*	0.07 (0.23)	0.04 (0.22)	0.12 (0.26)	0.21 (0.25)
Living conditions *j*	–0.56** (0.23)	–0.60*** (0.22)	–1.08*** (0.24)	–1.06*** (0.24)
Innovative activities *i*	–0.01 (0.01)	–0.02 (0.015)	–0.009 (0.02)	–0.01 (0.02)
Innovative activities *j*	0.02 (0.01)	0.02 (0.015)	0.05** (0.02)	0.04** (0.02)
Healthcare *i*	–0.01 (0.03)	0.009 (0.03)	–0.01 (0.04)	0.006 (0.04)
Healthcare *j*	0.03 (0.03)	0.02 (0.03)	0.03 (0.04)	0.01 (0.04)
ICT development *i*	–0.04 (0.08)	–0.004 (0.08)	0.13 (0.10)	0.15 (0.10)
ICT development *j*	0.04 (0.08)	0.02 (0.08)	0.17* (0.10)	0.19* (0.10)
Number of observations	20,667	20,667	13,350	13,350
R-squared(within)	0.02	0.02	0.05	0.05
AIC	15,966	15,971	6,148	6,163
BIC	16,117	16,122	6,290	6,291

Note: *, **, and *** indicate significance at levels 10%, 5%, and 1%, respectively. The fixed-effects model was estimated using the generalized least squares method.

http://vo.hse.ru/en/ 77

5) Entrepreneurial development;
6) Innovative activities and ICT development.

Thus, migration flows of university graduates are affected most of all by the basic gravity model factors, followed by regional economic development and labor market situation.

4. Routes of Graduate Migration

To analyze routes of university graduate migration, migration matrices are constructed for every federal district using interregional migration statistics (Table 5).

It follows from Table 5 that in Central Federal District (FD), 58.8% of graduates who leave the region of their graduation migrate within their home district, 12.3% move to regions of Northwestern FD, and about 10% migrate to regions of Volga FD. Graduates of Northwestern FD universities are attracted by regions within their home federal district (41%) and Central FD (40.5%). Most graduates of Volga FD universities find jobs in Central FD (46.3%), while 25.7% migrate within their federal district, and slightly under 11% move to Northwestern FD regions. Central and Northwestern Federal Districts are also preferred by university graduates from Southern FD (45.2 and 10.3%, respectively) and Far Eastern FD (30.7 and 10.6%, respectively).

The largest migration flow from North Caucasian FD goes to Central FD (37.5%), which is followed by Southern FD (25.4%). Ural FD graduates prefer to migrate within their home district (46.2%), followed by Central FD (28.2%) and the neighboring Volga FD (11.9%). Graduates of Siberian FD universities are most likely to move to Central FD (30.9%) and Ural FD (11.2%).

Similar matrices were constructed for 2013 and 2014. It turned out that migration preferences of university graduates did not change essentially in 2015 as compared to previous years, except for growing migration from all regions to Central FD.

To summarize, graduates are most attracted by regions of Central and Northwestern Federal Districts as well as regions neighboring their home region. Analysis of migration flows reveals two major routes of migration: from south to north and from east to west.

5. Conclusions and Discussion

Employability of and demand for university graduates in the labor market have been a subject of heavy public scrutiny. Migration processes reflect the labor market situation and living conditions in regions. Negative net migration rates of high-skilled youth are typical of most regions of Russia (48 out of 83 in 2015). The drain of recent graduates is expected to increase interregional disparities in economic development. Regions that keep losing their university graduates while not attracting workforce from other regions include Tomsk, Tyumen, Kursk, Ivanovo, and Oryol Oblasts. Expectedly, the most attractive regions

Table 5. **Migration flows of university graduates in 2015: a breakdown by federal districts** (%).

From	To							
	Central FD	Northwestern FD	Volga FD	Southern FD	Ural FD	North Caucasian FD	Siberian FD	Far Eastern FD
Central FD	58.8	12.3	9.97	5.9	3.6	2.5	4.4	2.5
Northwestern FD	40.5	41.1	5.1	2.9	3.4	1.1	3.4	2.5
Volga FD	46.3	10.9	25.7	4.2	8.3	0.5	3.3	0.8
Southern FD	45.2	10.3	5.9	27.5	3.5	5.6	1.1	0.9
Ural FD	28.2	7.1	11.9	2.4	46.2	0.2	3.1	0.7
North Caucasian FD	37.5	9.1	2.7	25.4	4	19.2	1.6	0.6
Siberian FD	30.9	7.9	2.6	2.2	11.2	0.16	39.4	5.6
Far Eastern FD	30.7	10.6	0.9	2.3	1.2	0.1	7.6	46.7

Note: Rows correspond to home regions, and columns to recipient regions. Row total is 100%.

for graduate migration include Moscow, St. Petersburg, and northern industrial regions (Khanty-Mansi Autonomous Okrug–Yugra, Krasnoyarsk Krai), which is consistent with earlier findings on migration of economically active population [Mkrtchyan, Vakulenko 2019]. Most often, university graduates migrate to regions of Central and Northwestern Federal Districts as well as the most economically advantaged neighboring regions.

The study performed revealed factors affecting interregional migration of recent university graduates in Russia. "Push" factors repelling graduates out of regions include low wages and high rates of poverty and unemployment. A dynamic labor market is the main "pull" factor attracting graduates, which is in line with Lee's theory of migration [Lee 1966] as well as with other research findings [Varshavskaya, Chudinovskikh 2014; Buenstorf, Geissler, Krabel 2016; Kozlov, Platonova, Leshukov 2017]. Innovative activities and ICT development are related positively to migration flows, yet the coefficients are insignificant in some models.

As we can see, migration of university graduates is largely influenced by regional economic development and labor market situation. The drain of young skilled workers may indicate a low demand for them as well as unattractive labor market conditions in their home region. Therefore, regional economic development agencies need to improve the quality of life and create new jobs, while universities need to adjust their education models to the structure and specific aspects of regional economies.

Appendix Descriptive Statistics for Variables

Description	Year	Min	Max	Median	Mean	SD
Migration flow from home region to recipient region	2013	0	18,187	2	42.99	302.06
	2014	0	15,361	1	43.20	286.33
	2015	0	14,043	2	42.61	277.63
Graduate net migration = in-migration — out-migration (persons)	2013	–6,166	17,650	–18	80.7	1,753.3
	2014	–535	18,174	–206	68.2	2,047.3
	2015	–5,597	33,978	–369	64.1	2,346.7
Graduate migration growth rate = net migration / graduate population (%)	2013	–31.63	1,013.4	–0.53	23.77	45.41
	2014	–31.65	1,063.1	–3.01	23.93	49.41
	2015	–37.16	470.99	–6.79	14.43	36.57
Population of university graduates in the region (persons)	2013	166	231,508	7,466	14,429	11,698
	2014	83,	216,938	7,244	13,381	11,183
	2015	76	199,115	6,879	13,626	11,062
Graduate in-migration (persons)	2013	301	70,962	1,541	3,641.5	3,519.4
	2014	213	82,809	1,433	3,610.2	3,678.6
	2015	238	87,327	1,298	3,558.5	3,750
Graduate out-migration (persons)	2013	16	70,947	2,046	3,560.9	3,108.3
	2014	10	64,635	2,018	3,542.0	3,081.1
	2015	11	53,349	2,096	3,494.5	2,929.7
Proportion of graduate out-migration in total graduate population (%)	2013	0.04	0.74	0.24	0.23	0.07
	2014	0.05	0.49	0.26	0.25	0.07
	2015	0.06	0.47	0.26	0.25	0.07
Ratio of graduate in-migration to economically active population (per 1,000 population)	2013	0.6	16.3	2.7	3.7	2.0
	2014	0.6	15.0	2.5	3.4	1.8
	2015	0.6	15.9	2.3	3.3	1.9
Ratio of graduate out-migration to economically active population (per 1,000 population)	2013	0.20	12.8	2.7	3.2	1.6
	2014	0.30	11.4	3.1	3.2	1.4
	2015	0.34	10.9	3.1	3.3	1.4
Ratio of graduate net migration to economically active population (per 1,000 population)	2013	–8.9	16.1	–0.02	0.51	2.66
	2014	–7.7	15.0	–0.3	0.24	2.60
	2015	–9.8	14.6	–0.9	0.05	2.76
Ratio of graduate population in the region to economically active population (per 1,000 population)	2013	0	33.7	12.9	13.1	3.8
	2014	0	30.6	11.6	12.1	3.8
	2015	0	28.2	12.6	12.8	3.7

Description	Year	Min	Max	Median	Mean	SD
Ratio of average wages in the region to the cost of the minimum expenditure basket	2013	1.8	4.8	2.3	2.5	0.4
	2014	1.7	4.6	2.2	2.4	0.4
	2015	1.6	4.4	2.1	2.2	0.4
GRP per capita (rubles)	2013	91,641	4,035,943	262,578	387,621	245,635
	2014	109,649.0	4,329,031	296,058	429,256	272,612
	2015	116,007.9	4,990,260	326,480	476,974	307,552
Unemployment rate (%)	2013	1.5	43.7	5.7	6.84	2.61
	2014	1.4	29.8	5.4	6.39	2.34
	2015	1.8	30.5	6.0	6.74	2.25
Average time to find a job (months)	2013	3.9	12.2	7.6	7.8	1.08
	2014	4.9	11.9	7.2	7.48	0.98
	2015	5.4	12.3	7.2	7.44	0.94
Poverty rate (%)	2013	6.6	35.4	12.5	13.4	3.3
	2014	6.9	34.7	12.6	13.5	3.4
	2015	7.2	38.2	14	15	3.8
Small businesses per 10,000 population	2013	26	414	123	129.1	37.3
	2014	23	419	126	129.1	37.1
	2015	15.4	316.9	128.8	133.4	39.7
Air pollutant emissions by stationary sources, thousand metric tons	2013	0.6	2,497	99	222.3	222.9
	2014	0.4	2,356	95	210.0	204.1
	2015	0.4	2,476	96	208.1	203.2
Annual theater attendance per 1,000 population	2013	0	655	189	197.1	76.8
	2014	0	726	195	204.2	75.5
	2015	0	780	191	208.0	76.5
Floor area per person (m^2)	2013	12.9	29	24	23.6	2.4
	2014	13.1	29.4	24.5	24.1	2.5
	2015	13.5	33.4	25	24.7	2.5
Infant mortality rate (the number of deaths per 1,000 live births of children under one year of age)	2013	4.4	23.9	8.2	8.7	2.0
	2014	4.3	23.4	7.3	7.9	1.8
	2015	3.3	16	6.6	7.0	1.5
Business innovation activities (%)	2013	1.0	25	9	9.8	3.5
	2014	0.5	29.2	8.7	9.7	3.5
	2015	1.6	24	8	8.8	3.4

Description	Year	Min	Max	Median	Mean	SD
Personal computers per 100 employed people	2013	20.4	78	38.9	40.1	6.4
	2014	20.9	71.9	39.1	39.2	6.2
	2015	28.7	72.8	40.8	41.4	6.0

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Academic Dishonesty and Research Productivity in a Changing Higher Education Environment
The Case of India's Engineering Institutions

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Received in November 2020

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Abstract

The Indian academic system is in a period of rapid transition, evidenced by the increasing number of higher education institutions, students and academics. However, very few studies have explored academics' research productivity and the various factors influencing it. Even those few studies have largely ignored the influences of indigenous factors and academic dishonesty on research productivity. Using a mixed-method approach, this research explores how the changing academic environment influences academics' research productivity in South Indian engineering institutions established after 1990. Important demographic factors influencing research productivity have been identified. The results show that indigenous factors play a major role in motivating the academics to conduct research, whereas corruption/academic dishonesty, thought to be prevalent at all levels in the higher educational system, tend to reduce their research motivation. The research shows the complex interconnections between the changing academic environment, indigenous factors and academic dishonesty, and their influence on academics' research. The results of this work can be used for informing future higher education policy-making in terms of increasing research productivity and decreasing a range of academic dishonesty in the context of a rapidly changing academic system.

Keywords

research productivity, changing landscape of higher education, Indian engineering institutions, motivation, academic dishonesty, corruption, indigenous factors.

For citing

Bakthavatchaalam V., Miles M., de Lourdes Machado-Taylor M., Sa M. J. (2021) Issledovatel'skaya produktivnost' i akademicheskaya nedobrosovestnost' v usloviyakh

menyayushchegosya landshafta vysshego obrazovaniya. Na primere tekhnicheskikh vuzov Indii [Academic Dishonesty and Research Productivity in a Changing Higher Education Environment. The Case of India's Engineering Institutions]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 2, pp. 126–151. https://doi.org/10.17323/1814–9545–2021–2–126–151

1. Introduction

Conducting research, advancing knowledge and publishing are at the heart of any Higher Education Institution (HEI), with academics being the crux of HEIs' Research Productivity (RP) [Machado-Taylor et al., 2017]. Publication has become an important indicator of productivity in academic institutions and has now become essential for the academics' carrier progression, measuring a department's performance, individual academic distinction, evidencing institutional excellence, acquiring grants and securing funding [Carayol, Matt 2006]. Thus, academics have to conduct and publish research for both personal and professional reasons. Consequently, HEIs must identify the factors influencing academics' RP to invest in those that increase it and to eliminate those that impede it.

The Indian Higher Educational System (HES) is rapidly evolving and, over the last 17 years, the number of HEIs has increased by 205%, the number of enrolled students by 311% and staff by 269%[1]. Furthermore, there has been a range of structural and policy changes in the HES. A few of these include decreasing governmental funding, increasing privatisation, the introduction of the institutional ranking system and an increasing emphasis on academics to conduct research publish, even though most of the academics and institutions are teaching-oriented. However, only a few studies have been carried out so far to investigate the influence of various factors on academics' RP and how these factors are interconnected with the rapidly changing HES. This study intends to bridge that gap in the literature and contributes to Sustainable Development Goal.

2. Literature review

2.1. Determinants of Research Productivity

RP is a measure of conducting and publishing research [Abramo, D'Angelo 2014; Altbach 2015]. It is an accumulation of different activities, including publishing papers, books, chapters, securing grants, supervising research students, serving as a peer reviewer, contributing to national, international committees, and filing patents, among others [Bakthavatchaalam et al., 2019; Horodnic, Zait 2015]. An academic's motivation to conduct research and their RP is an effect whose determinants are several and complex [Horodnic, Zait 2015; Aksnes 2012]. The literature looks at the various factors influencing RP in India and similar developing countries.

[1] UGC (2018) Statistics about Indian Educational system. https://www.ugc.ac.in/stats.aspx

Exploring the demographic factors, position in the institution, age group, educational attainment, experience and the type of institutions are seen to influence RP [Sahoo et al., 2017; Aksnes 2012; Smeby, Try, 2005; Bakthavatchaalam 2018]. Vuong et al. [2017], show that RP increases with age, with early-career academics having lower RP compared to their counterparts in Viet Nam. Hunter and Leahey [2010], and Aksnes et al. [2011] report that female academics, due to their substantial lack of research network and caring duties, produce comparatively less research than their male colleagues. Whereas interestingly, Bakthavatchaalam et al. [2020] found no difference in the RP of genders. Personal factors such as self-efficacy, research skills, interest in research and confidence are shown to be important predictors of RP [Horodnic, Zait 2015; Eam 2017; Snowball, Shackleton 2018].Smilarly, institutional factors such as support for research, funding, having a large faculty size and international collaboration, desire for promotion, and higher pay motivated academics' research, whereas poor research and writing skills contributed as barriers [Sanmugam, Rajanthran 2014; Baloch et al. 2020]. Exploring the institutional factors further, Tien [2007] and Vuong et al. [2019] identified the time allocated for different duties, pay scale, institutional policies and promotion opportunities as determinants of RP.

Nguyen [2015] comments that the collegial factors, the department they work in and national cultural factors influence RP. Tien [2016], further comments on the influence of socio-economic, and the cultural factors, including the culture of respect, and hierarchy on the academics' perception of research. The cultural systems are shown to be particularly influential in developing countries [Welch 2020; Altbach 2003]. Governing bodies, changes in the national and international education policies [Amaral et al. 2009; Frolich, Caspersen 2017; Tilak 2012], along with the changing academic environment [Arimoto et al. 2013; Rani 2010] are also seen to influence RP.

Most of the studies cited above were conducted in an international setting. Thus, it is critical to empirically test the applicability of the factors identified in the Indian HE setting. More importantly, it is essential to identify any indigenous factors particular to the Indian HE system so as to develop new models.

2.2. The Changing Academic Environment in India

This section discusses the various changes Indian HE is undergoing. Between 2000 and 2017, there has been a huge increase in the number of students, institutions and academics [UGC-Report 2017]. The report further shows that the Indian HES produces 2.5 million graduates per year, with more than 35.7 million students enrolled in HE. Yet, this represents merely a 24.5% gross enrolment ratio for 18 to 23-year-olds. By 2035, the Government intends to increase the enrollment ratio to 50%, which demands more institutions and faculty [Varghese, Malik 2016]. So, it becomes essential that proper policies are put in place to improve the institutional quality and the research conducted in them.

Along with massification, heavy privatisation of HE is another major change in India, with more than 75% of the newly established institutions being privately managed [AISHE2017] and commented to be of poor quality [Altbach. Mathews2020]. Privatisation is a result of the Government cutting its HE funding and expecting private players to bridge the gap [Rani 2010], with Altbach & Mathews [2020], and Varghese & Malik [2016] commenting that India's public spending on HE is less than most other BRICS (Brazil, Russia, India, China and South Africa) countries. Looking at the engineering institutions, there is a steep increase in the number of private HEIs in India[2]. For instance, of Tamil Nadu's engineering HEIs, more than 87% are privately managed[3]. The growth in private HEIs has raised huge concerns about the quality of education they provide [Jayaram 2007; Rani 2010]. Furthermore, Madheswari and Mageswari [2020] comment that the Indian engineering education as being volatile, complex, ambiguous and uncertain, and that despite the increase in numbers, it lags in impactful research.

Major policy changes in India, a prime example being the economic liberalisation in the 1990s, have resulted in the founding of a large number of HEIs. But most of these HEIs are teaching-focused and not research-based. However, currently, there is a shift towards research [Altbach, Mathews 2020]. This is seen, for example, from the Government introducing 'National Institutional Ranking Framework' and the 'Academic Performance Indicators' scores[4], in which research is given considerable importance, thus, hugely influencing academics' RP. The performance indicators quantify academics' research, such as publications, supervision patents filed, etc., by ascribing each of them a score. This can be used as a basis for pay rise and promotion. The ranking framework standardises and ranks the HEIs by quantifying criteria, such as research outputs, teaching and learning, student pass percentage, etc. As a result, even though poorly equipped, these institutions demand that their academics produce research to boost institutional ranking. Such pressures have resulted in academic dishonesty and corruption in the HE system [Bakthavatchaalam 2018].

Academic dishonesty includes manipulation of research data, buying research, paying bribes for promotion, accreditation, procurements, plagiarism, etc. Bakthavatchaalam et al. 2019; Hallak, Poisson 2007; Yang 2005]. Even though dishonest practices are seen to be prevalent in developing countries, studying their influence on academic research

[2] UGC (2018) Statistics about Indian Educational system. https://www.ugc.ac.in/stats.aspx

[3] All India Council for Technical Education (2017) List of AICTE approved institutions having NBA accredited courses (Status as on 10–04–2017). https://www.facilities.aicte-india.org/dashboard/pages/aicte_nba.php

[4] NIRF (2015) National Institutional Ranking Framework (Engineering). https://www.nirfindia.org/Home

is new in India, with only a few empirical investigations on this topic (see Bakthavatchaalam [2018] and Tierney & Sabharwal [2017; 2016]).

A range of other changes has influenced Indian HE, including the changing socio-cultural system, an increasingly educated population, and increasing support for the attainment of women [AISHE2017; Bakthavatchaalam et al. 2020], to name a few. Even within the HE system, there has been an increase in accountability, quality audits, paperwork, and decreasing regard for the academic profession in general ([Altbach 2011; Rani 2010]. The complete list of all the changes in the Indian academic environment would be long and their analysis considerable. Therefore, this section has provided a brief introduction to just a few of them. This rapidly changing academic environment has presented researchers with a lot of opportunities to study policy formation, RP, management of HEIs and job satisfaction, among other topics.

3. Need for this study

A review of the studies on Indian academics' RP and research motivation conducted by Bakthavatchaalam [2018] found that only 35 empirical papers were written from 1990 to 2017.Most of these papers focused on job satisfaction, followed by employee retention. Only four papers explored academics' motivation, but they focused on teaching motivation, rather than on research motivation or their RP. Also, none of the identified papers explored the influence of the changing academic environment and the indigenous factors/Elements of Cultural Identities (EoCI) on academics' RP. Even though there are a few newspaper articles and opinion pieces, there is a thorough lack of empirical studies in this area. With India wanting to become a knowledge hub in Asia, Bakthavatchaalam [2018] sustains the need to identify and empirically analyse the various factors influencing RP as an important aspect.

This study gains more relevance with the Government introducing various ranking frameworks in which RP plays a prominent role. To the best of the authors' knowledge, this is one of the first pieces of research exploring the various factors influencing academics' research motivation and RP, with reference to the changing academic environment in the increasing number of engineering institutions in South India.

The following research questions have geared this study:

1. What are the major factors influencing academics' RP in South Indian engineering institutions?
2. How does the rapidly changing academic environment influence academics' RP?

4. Methodology

This study used a mixed-method approach. Engineering institutions in Coimbatore city were chosen as a case study, as the city has the second-highest number of engineering HEIs in Tamilnadu, South India.

Collecting data from different disciplines, such as humanities, law and medicine, though tempting. However, only engineering institutions were chosen for the following reasons: Engineering is one of the rapidly expanding HE sectors compared with most other disciplines[5], with Madheswari & Mageswari [2020] commenting that India has around 25% of the world's engineers. Collecting cross-disciplinary data would have been a masive undertaking and would reduce the study's focus. In addition, comparing research between disciplines [Brew et al. 2015; Heng et al. 2020; Singh 2018] is difficult, one reason being the varied emphasis they place on different RP indicators. However, we do presume that the other disciplines and institutions might also face similar issues to the ones identified here.

A total of 643 questionnaires were distributed to academics working in 57 HEIs, of which 446 were returned, and 324 were usable. Overall, the usable response rate was 50.38%. The questionnaire was used to collect demographic details, measure the academics' perception of the influence of different factors on their research and quantify the various indicators of their RP. The various indicators include journal papers, conferences, books, chapters, research supervision and patents over the last five years.

RP was quantified by ascribing each of the indicators pre-determined scores, as seen in sub-section 4.1. A modified version of the 'Academic Performance Indicators' scores suggested by the University Grants Commission of India was used. Tests of differences and associations were used to identify the influence of demographic differences on RP. Factor analysis was used to identify the latent factors and Weighted Least Square regression was used to form models to measure RP from a combination of the latent and demographic factors. Quantitative results were used to inform the qualitative data collection through semi-structured interviews. A total of 16 interviews were conducted to identify and understand the interconnections between the changing academic environment and the factors identified.

4.1. Measuring research productivity

Important considerations for quantifying RP include which research outputs are to be used as indicators, the weighting for these indicators and the period of measurement. In this research, the total research productivity was calculated as:

$$RP \text{ over five years} = \sum s + \sum p + \sum pt$$

where 'RP' is the research productivity score, which was measured over a period of five years, '$\sum s$' is the sum of scores for supervising research students, '$\sum p$' is the sum of scores for publications and '$\sum pt$' is the sum of scores for patents awarded. The supervision score was meas-

[5] UGC (2018) Statistics about Indian Educational system. https://www.ugc.ac.in/stats.aspx

ured as a composite score for supervision at undergraduate, graduate and PhD levels. The publication score was calculated as a composite of the number of papers published in national and international journals, conferences, as well as the number of chapters and books authored. Although there are several schemes for weighing the indicators, such as the ones proposed by Horodnic & Zait [2015], Murray [2014], Rorstad & Aksnes [2015], and Sahoo et al. [2017], the academics in India use the University Grants Commission of India's Academic Performance Indicator framework[6] as a weighing scheme. This scoring system announced by the Government is being nationalised to create a common standard. This research uses a modified version of this performance indicator framework for weighing the indicators. For instance, a score of 8 was allotted for supervising a PhD, a score of 20 was allotted for publishing in an international level journal, and a score of 25 was allotted for registering a patent.

5. Results and discussion

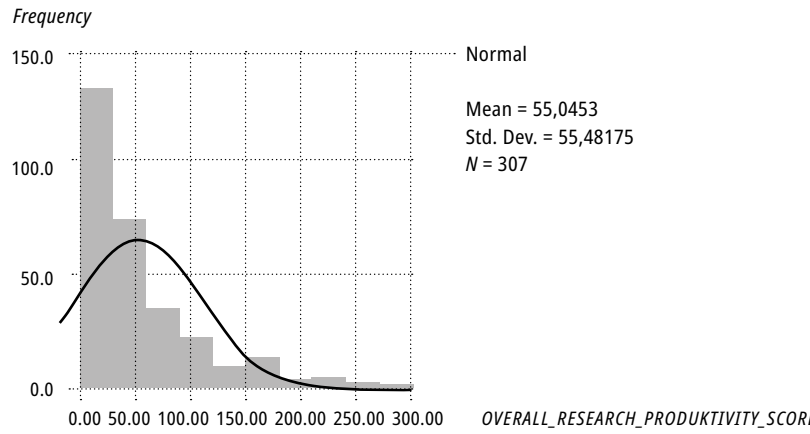
The respondents were 65% male and 35% female. 95% of the respondents were below 45 years old and 84.7% had less than 10 years of teaching experience. 75.9% of the respondents earned Rs.35K or less/month (eqv. 400 GBP), which is the recommended University Grants Commission's pay for assistant professors. The demography of the institution's age was well spread, considering that the target institutions were founded after 1990. 45.6% of the responses were from institutions less than 10 years old and 91.2% from institutions less than 20 years old. 91% of the respondents had a Post-Graduate degree and only 9% had already achieved a Ph D. 36.2% of them were pursuing a Ph D. This clearly shows that the bulk of the respondents were new lecturers who had started their lecturing profession after completing their PG and, among them, just over a third were pursuing their Ph D. The respondents' demographics were typical of Coimbatore's engineering academics [AnnaUniv 2017].

5.1. Academics' Research Productivity

The quantitative results worryingly confirm the academics' overall low RP (Figure 1), showing that most of the academics conduct little to no research, and a very few conduct a significant amount of research, similar to Lotka's law [Pao 1985]. Whilst several academics had a RP score of less than 50, there was one respondent who had a score of 300. That respondent was seen to have several co-authored papers. The academics' low RP is in contrast with the country's motivations of competing to be a world power and a research hub.

[6] The International Institute for Population Sciences India (2010) Proposed scores for academic performance indicators (APIs) in recruitments and career advancement scheme (CAS) promotions of University/College teachers. https://www.dei.ac.in/dei/files/IQAC/Guidelines.pdf; NIRF (2015) National Institutional Ranking Framework (Engineering). https://www.nirfindia.org/Home

Figure 1. **Academics' Research Productivity**



Reasons for the low RP, as commented by the respondents, include the lack of research skills, academic dishonesty (AD)/corruption at various levels of the HES, and a lack of research focus and institutional facilities. The interviews reveal that the academics and the institutions have mostly been focusing on teaching, with conducting research being something relatively new and enforced. They further commented that newly founded privatey managed HEIs have a short term and economically motivated focus, this being a main reason for the low RP.

Principle Component Analysis was conducted to reduce the number of variables and identify the latent factors. After iterations, a six-factor simple structured model was formed, which showed a sampling adequacy of 0.773 based on KMO and Bartletts Test, and the total variance explained was found to be 48.501%. Cronbach's alpha was 0.737, which is considered to be within the 'Good' range. Based on the rotated component matrix (Table 1), the six latent factors were renamed to better reflect their components (Figure 2).

Regression was conducted with the factor scores of each of the six latent variables from the principal component analysis, dummy variables and the RP score. The Durbin-Watson statistic for regression gave a value of 2.047, very close to 2, indicating good independence of residuals. The R-value was 78.2%, the R^2 value of 61.4% and the adjusted R^2 value of 54.8% ($p<0.0005$) of variance being explained. Table 2 shows the regression results with both the significant and non-significant variables.

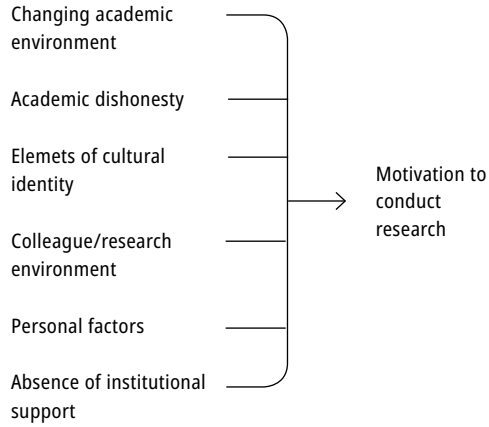
Looking at the regression analysis (Table 2), the demographic variables show that the position in the institution, institutional age, teaching experience, pay scale, degrees achieved, degrees working towards and the distance of the academics' residence from the campus influenced RP to varying degrees. Regardless of the position in the institution,

Table 1. **Final rotated component matrix with all co-efficient**

No	F	Rotated Component Matrix[a]	Component					
			1	2	3	4	5	6
1	F1.1	Increase in faculty workload	**.740**	.136	.126	–.135	.057	.103
2	F1.2	A drop in student quality	**.605**	.229	–.146	.051	.080	.177
3	F1.3	Faculties have more administrative duties	**.600**	.296	.084	–.098	.053	–.072
4	F1.4	Academia is becoming a less attractive career	**.582**	.302	–.188	.055	–.037	.203
5	F1.5	Teaching workload preventing me conducting research	**.564**	–.250	.272	–.166	–.071	–.068
6	F1.6	The colleges' focus on results, negatively impact faculty's research	**.520**	.073	.064	–.338	–.029	.294
7	F2.1	Some of the Coimbatore's engineering HEIs should not have been accredite	–.061	**.659**	.102	–.071	.125	.039
8	F2.2	Ineffective checks to counteract the malpractices	.076	**.659**	.077	–.153	–.011	.095
9	F2.3	Corruption has found its way into academic research	.282	**.654**	–.025	.025	.002	–.056
10	F2.4	Academics are buying research,	.364	**.594**	–.025	.115	.079	.072
11	F2.5	HEIs are less driven by social and moral responsibilities	.318	**.559**	–.060	–.206	–.055	.257
12	F2.6	Governing bodies have less concern on the research quality from the affiliated institutions	.049	**.531**	.192	–.180	.020	–.013
13	F3.1	Conducting research will earn me divine merit (Punniyam)	–.098	–.038	**.757**	.093	–.013	.150
14	F3.2	It is my moral duty to conduct research	.093	.041	**.739**	.127	.109	–.073
15	F3.3	Being of service to the society is my prime research motivator	.055	.097	**.678**	.156	.227	–.085
16	F3.4	It is a God given duty to teach and conduct research.	–.095	.161	**.517**	.265	.184	.002
17	F3.5	Being a role model to the society	.097	.070	**.500**	.074	.078	.141
18	F4.1	Stimulated by colleauge's resarch	.035	–.069	.075	**.677**	–.120	–.028
19	F4.2	Recognition as a motivator	.091	–.074	.138	**.581**	.134	–.106
20	F4.3	Job security	–.241	–.049	.214	**.580**	.111	.103
21	F4.4	Encouragement from the institution	–.199	–.227	.104	**.570**	.048	–.145
22	F4.5	Discussing colleauge's research	–.177	–.050	.159	**.536**	.156	–.028
23	F5.1	Interest in research	.000	.003	.068	.147	**.762**	–.025
24	F5.2	Enjoy conducting research	–.041	.046	.083	–.067	**.753**	.083
25	F5.3	My career progression	.063	.036	–.025	.312	**.527**	–.045
26	F5.4	Confidence in research skills	.012	.062	.176	.113	**.518**	.038
27	F5.5	Personal curiosity	.065	–.005	.256	–.248	**.494**	–.099
28	F6.1	No institutional support to improve research skills	.058	.006	.038	–.123	.101	**.770**
29	F6.2	No flexible teaching hours to support research	.068	.019	.127	–.008	–.006	**.761**
30	F6.3	Institutions' lack of research vision	.272	.248	–.044	–.052	–.133	**.589**

[a] Rotation converged in 9 iterations.
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
Source: Produced by the authors.

Figure 2. **Factors influencing academics' RP**



everyone was being pressured to either become active researchers or increase their research outputs. This is in addition to their teaching duties, which are seen to be their primary job. As expected, academics with a PhD or working towards it are seen to have higher RP than their counterparts. Similarly, experienced academics have higher RP.

It is very interesting that 'gender' is not seen to influence RP, contradicting the works of Rorstad and Aksnes [2015], and Smeby and Try [2005], who report female academics being less research productive than their male counterparts. However, this research finds no such differences.

Bakthavatchaalam et al. [2020] identified that, even though females in India have a range of barriers to conduct research, they were still resilient and produced the same amount of research as their male counterparts. The barriers they found include sociocultural expectations; family-oriented issues; professional and institutional factors; limited professional contacts; and not being able to travel far for data collection, among other factors. Bakthavatchaalam et al. [2020] further identified the factors aiding female researchers' resilience in managing to produce the same amount of research as their male counterparts. These include increasing family support before and after marriage; focus and dedication to work; the changing social system; increasing education for women; and the types of research chosen by women.

The regression analysis (see Table 2) reveals that AD (Academic Dishonesty) influences RP negatively. Conversely, Elements of Cultural Identities (EoCIs) are seen to increase RP. Even though statistically not significant, the interviews showed the importance of the changing academic environment and its influence on RP.

EoCIs include academics considering that teaching and conducting research is a God-given duty, perceiving research as a moral duty,

Table 2. **Regression coefficients for WLS regression:**

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	90.783	16.132		5.627	.000
REGR factor score for Changing Academic Environment	–2.166	1.727	–.060	–1.254	.211
REGR factor score for Academic Dishonesty	4.577**	1.553	.133	2.946	.004
REGR factor score for Indigenous Factors	–3.611**	1.741	–.091	–2.074	.039
REGR factor score for Colleague/Research Environment	1.265	1.609	.038	.787	.432
REGR factor score for Personal Factor	1.528	1.575	.043	.970	.333
REGR factor score for Absence of Institutional Support	–1.679	1.573	–.048	–1.067	.287
Age (CG: < 25 years old)					
25 to 35 years old	2.475	4.470	.034	.554	.580
36–45 years old	1.001	8.437	.007	.119	.906
46–55 years old	–24.264	17.169	–.072	–1.413	.159
> 55 years old	–56.545	54.268	–.098	–1.042	.298
Age of the institution (CG: 5–10 years)					
<5 years	–24.309***	4.684	–.310	–5.190	.000
11–15 years	8.592	5.506	.077	1.560	.120
16–20 years	–8.175*	4.228	–.125	–1.933	.054
> 20 years	–26.093	23.682	–.140	–1.102	.272
Position in the institution (CG: Associate Professor)					
Assistant Professor[†]	–17.653*	10.406	–.130	–1.696	.091
Professor	–55.399	37.374	–.116	–1.482	.139
Head of the department	–34.586*	18.293	–.105	–1.891	.060
Other positions	–19.987	16.650	–.086	–1.200	.231
Teaching experience (CG: 5–10 years)					
<5 years	–26.211***	4.641	–.328	–5.648	.000
11–15 years	34.406**	13.168	.131	2.613	.010
15–20 years	51.793*	29.561	.078	1.752	.081
> 20 years	79.687***	25.705	.231	3.100	.002
Pay range/month (CG: <25K / month)					
25–35K / month	–1.180	4.104	–.015	–.288	.774
35–45K / month	–18.610*	10.470	–.095	–1.777	.077
45–55K / month	45.707	26.236	.132	1.742	.083
55–65K / month	24.094	23.690	.121	1.017	.310
> 65K / month	7.355	26.148	.025	.281	.779
Degrees achieved (CG: PG / Masters)					
Achieved UG	–7.255	9.155	–.050	–.792	.429
Achieved Mphil	–43.358***	7.098	–.295	–6.108	.000
Achieved PhD	52.420***	16.570	.229	3.164	.002
Working hours/day (CG: <6 hours / day)					

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
6–7.5 hours/day	–7.327	4.947	–.110	–1.481	.140
7.5–8 hours/day	3.787	4.951	.059	.765	.445
> 8 hours/day	3.436	6.189	.037	.555	.579
Teaching related hours/Week (CG: < 7 hours / week)					
7–14 hours/week	–.265	7.531	–.003	–.035	.972
15–23 hours/week	–11.705	7.153	–.181	–1.636	.103
> 23 hours/week	–4.692	7.563	–.059	–.620	.536
Residence from campus (CG: In the campus)					
Residing within 5 Km of the campus	–12.467**	5.971	–.172	–2.088	.038
Residing within 20 Km of the campus	–5.948	6.134	–.081	–.970	.333
Residing more than 20 Km of the campus	–9.802*	5.921	–.153	–1.655	.099
Industrial experience (GC: Yes)					
No	.655	3.772	.009	.174	.862
Gender (CG: Female)					
Male	–5.305	3.461	–.084	–1.533	.127
Degree working towards (CG: PostGraduation/Masters)					
PhD	10.364**	3.715	.142	2.790	.006

Dependent variable: ORP. Weighted Least Squares Regression — Weighted by wts1. CG: control variable
*** <0.005, **<0.05, *>0.1
† Please note that the entry position of an academic is an 'Asst. Prof.' and not a lecturer.
Source: Produced by the authors.

wanting to be of service to the society and a role model, and a thought that conducting proper research will give them divine merit for their next life. Furthermore, the psychological satisfaction of conducting research was reported as a prime motivator. It can be seen that EoCIs are composed of internal motivators and reflective of women's personal beliefs. EoCIs were commented to influence an individual's mind-set on how to conduct research ethically. Despite academics agreeing to the importance of EoCIs, they did not offer a detailed view of how EoCIs impact RP.

Even though India is a rapidly developing country, it is still conservative. The data reveal the positive influence of EoCIs on RP, indicating the importance of localising the research practices, as pointed out by Khatri et al. [2012], and not just to borrow practices as a quick fix. Especially, the importance of having strong role models who inspire ethical research was commented to be important. As one of the respondents commented,

> "Having a role model and wanting to be one is very important" (New female).

In light of this, HEIs should promote positive research role models. Creating an ethical research environment that appreciates and rewards ethical research behaviour could be used to reduce academic dishonesty.

In terms of academic dishonesty, the interviews revealed a plethora of dishonest practices/corruption at three different levels: staff/academic, institutional and governing body levels. As an experienced male academic commented,

"There is 100% dishonesty".

This is also supported by the questionnaire, which showed that 72.2% of the academics agree or strongly agree that corruption has found its way into academic research. They commented that academics are buying research rather than conducting it themselves. The list of dishonest practices reported at different levels would be long and is not included in this paper. The main reasons for academic dishonesty were varied. At the staff/academic level, dishonesty was ascribed to survival, promotion, pay rise and the lack of research skills, time and research facilities. At the institutional level, survival, increasing recruitment, quickly moving up the institutional ranking and money-making were reported as the main reasons. At the governing body level, an inability to control dishonest practices, improper planning in allowing the increase of institutions and money-making were mentioned. These reasons are reflective of the works of Mohamedbhai [2016], Daniel [2016] and Eckstein [2003]. Corruption is not particular to academia but is an overflow into academia, from the corruption that goes on in government offices and in society at large.

In theory, written codes and laws do punish corruption and dishonest practices, and the Indian culture deems it immoral. Yet, as Rothstein [2017] comments, there is a distinction between moral and social norms. Whilst moral norms entail the principles, social norms are the presumed social practice. People might believe that academic dishonesty is morally wrong, but if that is the social norm/practice, they find little point in doing otherwise.

The changing academic environment included the rapid increase in the number of institutions and seats, the new HE ranking systems announced by the Government, an increasing workload, with the academics having to take on more administrative/paperwork, and a drop in the quality of the students recruited. The policy changes, the increasing number of HEIs and the number of student seats in the last few years were indicated as being some of the most influential changes in the Indian HE system.

One of the major changes in academia recently is how the worth of an academic is measured. Traditionally, their efficiency would be measured based on their teaching prowess. Along with teaching, if they conducted research, they would be even more respected. However, currently, with the recent changes in the ranking system[7], even

[7] NIRF (2015) National Institutional Ranking Framework (Engineering). https://www.nirfindia.org/Home

in teaching-oriented HEIs, an academic's worth is measured by how research-productive they are. So, just to quantify for a pay rise or promotion, the academics commented to be conducting research. As a respondent stated,

> "If you tell them [academics] that there is no need to conduct research for promotion or pay rise, very few will do research" (Experienced male).

Rather than looking at the influence of the changing academic environment and the other factors separately, the next section addresses the various interconnections between the factors and how they influence the quantity and quality of academics' research.

5.2. Interconnected nature of Academic Dishonesty, Elements of Cultural Identities and the Changing Academic Environment

At the outset, the changing academic environment, academic dishonesty and EoCIs might appear to be individual elements influencing RP. However, the interviews revealed the interconnections between them and how their interplay influences academics' RP.

The interviews clearly show how academic dishonesty and the changing academic environment, in terms of the increase in the number of engineering HEIs, are connected. For instance, the institutions are reported to be paying bribes and being involved in corruption for getting approvals, setting up of the institution, and securing affiliation and accreditation from various governing bodies. The data also suggest that the accrediting bodies poorly planned the explosive growth in the number of institutions and seats available, which should have been better managed.

Due to the increasing number of seats being made available in each of the HEIs, the more established institutions take in more students who otherwise might have joined the newly founded ones. Target institutions' enrolment data showed that a lot of the newly founded institutions had more than half of their available seats unfilled. Even more surprising was to see a few institutions in which, even though there were 60 places available, only seven students were enrolled. As an experienced male academic commented,

> "A few years ago, institution 'x' would have only 60 seats available, in Mechanical Engineering. But now, since 'X' has been allowed to recruit 120 or 180 students, this takes away the quality and quantity of students who would have selected the other institutions. This has created a situation in which the top institutions take twice or thrice the number of students than before, leaving all the new institutions to fight for students".

Most of these new institutions are for-profit and privately managed, depending on students' tuition fee to run. With low enrolment, these institutions are unable to sustain operating, pay their staff properly or

invest in research facilities, which negatively affects their academics' research. As an experienced (male) academic commented,

> "Imagine if you own one of the bottom institutions in which there is a total of 120 seats available, but you get only 22 students in the classroom. As a college owner, realistically, how can you focus on research, recruit high calibre staff, set up research facilities?"

These institutions were reported to be in a 'survival mode' and get involved in various systemic academic dishonesty to cut cost and survive. These include the institutions paying their staff less than what they are supposed to receive, as well as recruiting under-qualified and fewer staff than stipulated by the Government.

Academics getting paid less than what they should be was seen to be becoming a common practice in the privately-owned HEIs, which is similar to the results of Kumar [2014]. This creates a group of academics who have to work for lower pay and have a higher workload than properly paid academics. In such circumstances, it would be difficult for them to conduct meaningful research. The respondents also commented that, during inspections, HEIs recruit 'ghost lecturers' who exist only during inspections and only in paper. As an academic commented,

> "During an inspection, they [HEIs] hire a PhD holder just for the inspection, create fake records as if he/she [Ghost lecturer] has been working at the institution for a year or so. When the inspection is over, he/she gets paid and leaves" (Experienced male).

One way or the other, academics become a part of these range of institutional dishonest practices, which again negatively influence their research, the way they conduct it and their moral standing. Such academic dishonesty, along with the changing academic environment, notably the declining quality and quantity of students (as the newly founded institutions have to take students with very low grades just to fill the seats), has significantly increased academics' workload and administration/paperwork. These conditions have led them to comment that academia is becoming a less attractive career.

Traditionally, the academic profession has enjoyed considerable autonomy and has commanded respect within the community. But now, the academics comment that the decline in their status of being a 'guru' has negatively influenced them in wanting to be an academic. This is directly linked to the changing academic environment and the EoCIs. Culturally, a guru is considered an irreplaceable person in a community. However, with the recent changes in academia, with little job security, academics see themselves as easily replaced. Along with this, the institutions not paying them according to the norms, or pay-

ing in arrears has collectively affected not only their RP but also their perception of the academic profession on the whole.

> "[...] A lot of academics in the lower strata of institutions are losing their sense of being an academic, and few of them have left the academic profession and started a food business, milk vending, etc., and usually they get paid more" (Experienced male).

Linking this comment with the cultural perspective, it entails a huge change, as most of the academics traditionally retired as one. However, the results show the extent to which their sense of being an academic has changed.

Academics commented that, along with the already loaded duties, their role now mandatorily includes that they personally canvass and recruit a certain number of students to their institutions. They are also required to canvass the local industries requesting them to recruit their students after graduation. As a young female academic commented,

> "Until a few years ago, if a staff member recruited a student, they would be monetarily rewarded. But now, staff 'should' recruit a certain number of students or else they do not get paid for the summer vacation month! So, now the staff go canvassing to peoples' homes often exaggerating the institutional facilities".

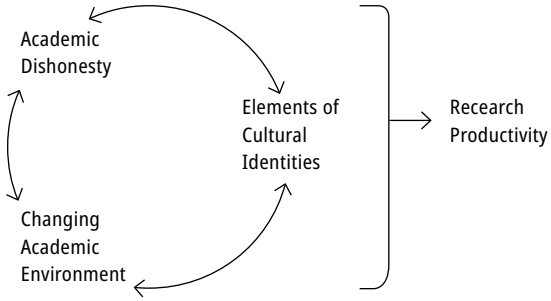
On this, Bakthavatchaalam et al. [2020] comment that female academics find it more difficult to recruit students and to network with the local industries due to existing social norms. In such a pressurised environment, research becomes an afterthought. Yet, for academics to get higher pay or promotion, they have to conduct research and, to accomplish it, they, in turn, indulge in dishonest practices.

> "When people must do something [research] they are not trained for under the pretext of job security, academic dishonesty will prevail. It has become a job security issue now [...]" (Young male academic).

The academics in these institutions are reportedly under-qualified and not skilled in research. When they are expected to conduct research, they partially or fully buy research from the so-called "research agencies"/paper mills. These agencies write papers/theses with fake data and also help academics publish quickly through predatory journals. These journals are not bothered about the research quality [Saroja et al., 2016] but just about the payment. Interviews with these agencies revealed that they fabricated the data based on their customer's (academic) requirements.

As one of the agencies commented,

Figure 3. **Interaction between the factors and their influence on RP**



> "[…] Who collects real data? I would definitely say that 95% of the data 'collected' by the agencies are just made up based on what the researcher wants the results to be".

This puts into question the results of such research and the papers that use these works as reference material. The fact that agencies use plagiarism-detecting software and their increasing sophistication adds to the difficulty in detecting fake research.

Especially in engineering, such fake research could be dangerous and decreases the confidence of funding bodies and industries in the research conducted. The points identified from the interviews on academic dishonesty are reflective of the works of Daniel [2016], Poisson [2010], and Tierney & Sabharwal [2017].

It is critical to note an important link between EoCIs and dishonest research practices: academics who perceive EoCIs as important for RP are less involved in dishonest practices and vice-versa. Worryingly, the interviews suggest that when an honest academic sees their peer getting a promotion or pay rise by dishonest publication, it negatively affects their integrity, tempting them to choose dishonest means as well.

It should be noted that the academics' involvement in dishonest research practices is a self-inflicted fall from their traditionally held high moral standards. This is a result of the changing academic environment and the pressures it has placed on the academics. The data show 'survival' and 'lack of research skills' as two of the main reasons for academics to be involved in dishonest research practices. So, HEIs could form policies to increase academics' research capabilities and provide them with more opportunities to conduct research. This would not only reduce academic dishonesty but also motivate them to conduct research on their own.

This section sought to shed light on the complex interconnections between academic dishonesty, EoCIs and the changing academic en-

vironment, and their influence on academics' RP. Figure 3 models the interaction between the three and their influence on academics' RP.

6. Conclusion

This is a timely study that reveals the current state of RP in this area and offers a few thoughts on which future policy formations could be based to increase the quantity and quality of academics' RP. Even though there are already policies in place at various levels (academic, institutional and governing bodies) to increase RP and to reduce dishonest practices, they seem to be ineffective. So, it is critical to assess these policies and changes made. The research suggests that bespoke policies should be formed based on EoCIs, as they could well counter academic dishonesty due to their inverse relationship. The importance of EoCIs in conducting research shows that the policies formed should be more localised and based on the cultural elements. Future HE policies should consider the various interconnections between the changing academic environment, EoCIs and academic dishonesty, and their influence on academics' research. The policies should also look into decreasing or ideally eliminating the negative impacts of the changing academic environment and academic dishonesty.

7. Limitations

One of the limitations of this study is the lack of empirical research in this field in India, limiting the potential to compare the results with similar studies. Academics' RP was measured solely based on the quantity of different publications, and, thus, future research could consider both the quantity and quality of the publications. This research was conducted in South Indian engineering institutions and, so, generalising it to other cultures and countries should be done with caution. Finally, future studies should look into assessing the quantitative and qualitative impact of the various policies on RP. Studies should also explore how the broader social changes that are happening in the country, COVID-19 and its effects influence the HE system and academics' research.

The article was presented at the 31st Annual Conference of the Consortium of Higher Education Researchers (CHER), held at the HSE on August 30 — September 1, 2018.The topic of the conference is "Differentiation and Integration in Higher Education: Patterns and Dynamics".

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Measuring Parental Control and Its Relationship to Cognitive Abilities of Early-Grade Students

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Received in August 2020

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Abstract

The article presents a tool for assessing the parental regulation of children's behavior at the start of the school. The questionnaire assesses the implementation by parents of two typical control functions (direct control of the child's behavior and communicative mediation between the child and the environment), as well as a poorly studied construct — parental control over digital devices ("gadgets") that the child uses. It was demonstrated that the severity of parental control is sensitive to the characteristics of parents (higher education, age, number of children in the family) and the characteristics of the child (cognitive achievements at the start of the school).

Keywords

parenting control, primary school, children cognitive results, digital control.

For citing

Lanina E. V., Bochaver A. A., Antipkina I. V. (2021) Izmerenie roditel'skogo kontrolya i ego svyaz' s kognitivnymi rezultatami uchashchikhsya mladshikh klassov [Measuring Parental Control and Its Relationship to Cognitive Abilities of Early-Grade Students]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 2, pp. 152–171. https://doi.org/10.17323/1814-9545-2021-2-152-171

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The Gender Gap in Early-Career Wages of Universities' and Vocational Education Institutes' Graduates

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Received in October 2020

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Abstract

Data from the Federal Statistical Sample Survey of Employment of Vocational Education and Higher Education Graduates is used to measure the gender wage gap and analyze the factors explaining gender inequality. The Mincer equation with Heckman sample selection bias correction as well as the Blinder–Oaxaca and Neumark decomposition methods are applied to measure gender differences in earnings. Findings show that women are paid 18–20% lower than men, the educational and socio-demographic characteristics as well as labor market factors being controlled for. The gender wage gap is largely dependent on education attainment, reaching 25% among graduates from skilled-worker vocational programs, 20% among mid-level professionals, and 18% among college graduates. Decomposition of the gender wage gap allows assuming an essential proportion of unexplained differences that may arise from discrimination and unobservable factors.

Keywords

discrimination, gender inequality, gender wage gap, gender segregation, graduate labor market, returns to education.

For citing

Kiryushina M. A., Rudakov V. N. (2021) Gendernye razlichiya v zarabotnoy plate vypusknikov vuzov i uchrezhdeniy SPO na nachal'nom etape kar'ery [The Gender Gap in Early-Career Wages of Universities' and Vocational Education Institutes' Graduates]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 2, pp. 172–198. https://doi.org/10.17323/1814-9545-2021-2-172-198

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Measuring Basic Mathematical Literacy in Elementary School

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Received in September 2020

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Abstract

Measuring mathematical literacy is not easy as this construct is multicomponent and tasks often involve a lot of reading. Generally, intended users of test results want information about the overall level of respondents' mathematical literacy as well as its specific components. According to educational and psychological testing standards, reporting overall scores together with subscores simultaneously requires additional psychometric research to provide evidence for validity of all scores reported. A study performed shows that PROGRESS-ML, a test measuring basic mathematical literacy in elementary school pupils, can be used as a one-dimensional measure, allowing overall test scores to be reported. Meanwhile, reading skills do not contribute significantly to the probability of item responses, and subscores can be reported independently as complementary to the total score.

Keywords

basic mathematical literacy, complex construct, composite measure, PROGRESS-ML.

For citing

Federiakin D. A., Larina G. S., Kardanova E. Yu. (2021) Izmerenie bazovoy matematicheskoy gramotnosti v nachal'noy shkole [Measuring Basic Mathematical Literacy in Elementary School]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 2, pp. 199–226. https://doi.org/10.17323/1814–9545–2021–2–199–226

Translated from Russian by I. Zhuchkova.

Modern education and, broader, social sciences witness a growing demand for composite measures, i. e. instruments consisting of subscales that contribute in a particular manner (as a sum or a weighted sum of subscores) to the overall score on the test. Such instruments are indispensable to measure composite constructs, e. g. the so-called 21st-century skills or new literacies. These constructs comprise different components and are difficult to treat as a classical unidimensional (single-component) persons' characteristic. At the same time, prac-

titioners and policymakers who base their decisions on the results of measurement value the information about the overall level of performance as well as its individual components. This enriched information is valuable for improvement of the education system as a whole.

In terms of psychometrics, composite measures are multidimensional instruments that serve to evaluate the overall level of examinees' literacy as well as its individual components.

The Standards for Educational and Psychological Testing [American Educational Research Association, American Psychological Association, National Council on Measurement in Education 2014] state that (i) scores should not be reported for individuals unless their validity, comparability, and reliability have been established, and (ii) if a test provides more than one score, the psychometric quality of *all* the subscores should be established. These quality standards are important because just as inaccurate information at the total test score level may lead to decisions with damaging consequences, inaccurate information at the subscore level can also lead to incorrect remediation decisions [Sinharay, Puhan, Haberman 2011]. In academia, the use of low-quality subscores may result in misleading conclusions about the nature of the phenomenon analyzed.

Basic mathematical literacy is one example of composite constructs. There have been numerous attempts to define basic literacies with regard to most diverse aspects of the construct, from content area to their necessity for a life in a modern world [Froumin et al. 2018]. What all these definitions have in common is that they define literacy as the ability to solve daily life problems. Due to diversity of such problems, instruments measuring basic literacies place task models into widely heterogeneous contexts in an effort to measure effectiveness of solving specific types of problems. That is how such instruments (measuring basic mathematical literacy) become composite: they represent a certain integrated measure of an examinee's ability to solve various problems involving math operations. A number of researchers believe that such a structure of composite measures leads to nuisance skills "interfering" with problem solving (see, for example, [Grimm 2008]). As a consequence, one of the key psychometric issues with such measures is the demand for valid and psychometrically sound total score on the test as well as subscores on its individual components.

The present study seeks to test and substantiate different approaches to modelling data of the PROGRESS-ML test designed to measure basic mathematical literacy in elementary school. The article is structured as follows. First, an overview of theoretical challenges in measuring basic mathematical literacy is given. Next, the theoretical framework and structure of PROGRESS-ML are described. As long as the focus of this article is on psychometric modelling, it does not investigate deep into different ways of interpreting the theoretical framework of the test, its design peculiarities, or the relationship

between test content and elementary school curriculum — without belittling the significance of such work. Further on, the existing psychometric approaches to composite measurement models are described, and a rationale for choosing one of them is provided. After that, empirical data collected with PROGRESS-ML is analyzed. At the first stage of this analysis, the reportability of the total score on the basic mathematical literacy test is evaluated. The second stage tests the hypothesis that reading skills make an important contribution to performance on the basic mathematical literacy test. Finally, the third stage evaluates the reportability of subscores gained in specific content areas and measuring specific types of cognitive processes. The final section of this article provides a psychometric interpretation of the results obtained and describes their contribution to educational and psychological measurement methodologies.

1. Challenges in Measuring Basic Mathematical Literacy

Mathematical literacy is a competency that everyone needs to handle everyday situations, such as grocery shopping, cooking, bill payment, etc. In Russia, mathematics has been traditionally regarded as a school subject that is critically involved in other academic disciplines and as a unique tool for promoting "cognitive development in mainstream schools" [Kozlov, Kondakov 2009]. However, measuring the mathematical literacy of students is difficult due to challenges in defining the construct.

Researchers and practitioners around the world have not yet come up with any consensual concept of mathematical literacy that could be defined by a certain set of knowledge and skills [Jablonka 2003]. Mathematical literacy includes computational skills, knowledge and understanding of fundamental mathematical concepts, spatial thinking, real-world problem solving skills, ability to implement complex problem-solving algorithms and to analyze data from graphs. Even tests measuring mathematical literacy in preschool-age children are designed using divergent sets of basic knowledge and skills from an impressive list, which includes mental calculation, numerical knowledge, number sense, object counting, shape recognition, measuring, etc.

Challenges in defining and, consequently, measuring mathematical literacy of school students come, in particular, from the dependence of mathematics as a school subject on the specific school curriculum which is designed in accordance with the formal goals of mathematics education. For example, a number of curricula focus on the systemic role of quality mathematics education for scientific progress (e. g. the 2013 Concept of Mathematical Education in the Russian Federation[1]). Another approach, supported by some of the existing international

[1] Concept of Mathematical Education in the Russian Federation. Ministry of Education and Science of the Russian Federation: http://www.math.ru/conc/vers/conc-3003.pdf

surveys of education quality such as PISA[2] [OECD2019], makes it a priority that by the time school students complete the obligatory stage of education, they should possess the skills of handling various everyday situations, from grocery shopping to arranging furniture at home.

The only consensus achieved so far among researchers is on the development trajectories of particular mathematical skills in preschool and school [Purpura, Baroody, Lonigan 2013]. It is still unclear, for instance, when and how young children develop the ability to understand and process symbolic numerical representations (digits and numbers) [Benoit et al. 2013; Kolkman, Kroesbergen, Leseman 2013], to what extent the development of mathematical skills depends on other cognitive abilities [Peng et al. 2016; Toll et al. 2015], or which early competencies are the best predictors of formal math performance [Chen, Li 2014; Libertus et al. 2016; Schneider et al. 2017]. As for school math instruction, skills acquired by students become more and more divergent with every subsequent grade due to differences in curricula, which makes it virtually impossible to identify a single construct to describe mathematical literacy.

Another challenge in defining mathematical literacy is that this construct demonstrates not only what knowledge students possess but also in which situations they can apply it. Different content areas are assessed using tasks designed to induce different levels of cognitive load. For example, a problem in which students are asked to estimate the height of a column in a histogram requires less cognitive effort than the one in which students have to process information from a graph which they see for the first time. For this reason, a number of assessments also measure mathematical literacy through the prism of the cognitive processes involved in problem solving. For instance, PISA measures the level of 15-year-old students' theoretical knowledge in specific content domains (quantity, space and shape, etc.) and their ability to apply this knowledge at every stage of problem solving [OECD2013].

Finally, challenges in measuring mathematical literacy also arise from the fact that mathematical skills are closely associated with reading literacy. In a longitudinal study conducted on a low-income sample of students from the Chicago Public Schools, third grade reading comprehension was found to be a positive significant predictor of gains in mathematics skills up to eighth grade controlling for prior mathematics performance. The largest effects of reading achievement were shown for the problem solving and data interpretation [Grimm 2008]. Similar results were obtained in analyses comparing the mean scores of students across 22 countries that took part in two international assessments conducted in 2003: PISA reading scores are highly corre-

[2] Program for International Students Assessment, administered every three years to measure mathematical, reading and scientific literacy of 15-year-old school students.

lated with performance in the TIMSS "Data" content domain,[3] which measures the ability to read graphs and interpret diagrams (r = 0.91, the correlation coefficients with other content domains varied from 0.57 to 0.79) [Wu 2010]. Math disabilities (dyscalculia) often co-occurs with dyslexia[4] [Joyner, Wagner 2020], children with comorbid mathematics and reading difficulties performing worse in mathematics than children with dyscalculia only [Jordan, Hanich, Kaplan 2003].

The relationship between mathematical and reading literacy is complex and still largely dubious. On the one hand, both constructs can involve the same cognitive processes: for instance, numerical cognition was found to depend on language skills in early childhood [Gelman, Butterworth 2005]. Miscomprehension of the language of word problems can be another possible explanation of this relationship [Cummis et al. 1988]. According to Anne Newman's hierarchy of error in written mathematical tasks [Newman 1977; Casey 1978], the first two stages in solving any word problem depend directly on the reading skills of decoding and comprehension, which imply reading the task carefully, understanding the context of the problem and the question asked, and collecting all the necessary information. Errors at these stages account for 12 to 22% of all solution errors (see, for example, a review of studies in [Clements, Ellerton 1996]). Therefore, obtaining the correct solution to any written mathematical task depends on whether the pupil makes errors during the first two steps in attempting to answer it, e. g. by reading "minutes" instead of "minus" [Clements 1980].

As we can see, mathematical literacy is not a binary but complex and multifaceted construct that involves a broad array of mathematical skills. It would be difficult to evaluate the development of mathematical skills — from informal knowledge in preschool to sophisticated methods in high school — on a single scale. Besides, mathematical skills involved in solving word problems and reading graphs largely depend on reading comprehension. The construct's complexity and relationship with other intellectual skills make assessment of mathematical literacy even more challenging and require advanced psychometric models to validate the instruments.

2. The PROGRESS-ML Basic Mathematical Literacy Test

The PROGRESS-ML Basic Mathematical Literacy Test is part of the PROGRESS instrument[5] designed to measure basic literacies in elementary school pupils for the purposes of learning process support and improvement. PROGRESS measures basic literacies in mathemat-

[3] Trends in Mathematics and Science Study, administered every four years to measure mathematical and scientific literacy of fourth- and eighth-grade students.

[4] A learning disorder that involves difficulty reading and writing.

[5] The instrument was designed by the Institute of Education (Higher School of Economics).

Table 1. **Content areas covered by the PROGRESS-ML test.**

Content area	Number of items	Description
Spatial concepts	7	The items measure pupils' ability to understand spatial relationships and mentally represent 2D and 3D objects. Children are required to not only recognize different geometric shapes but also visualize new geometric objects by combining 2D or 3D figures into one.
Measuring	6	Successful performance on this module demonstrates understanding that numbers can not only be used for specifying position in a sequence but also serve as attributes (length, surface area, etc.). The tasks evaluate children's ability to manipulate numbers as measures.
Patterns and sequences	6	The items measure pupils' ability to recognize and extend arithmetic and geometric sequences as well as their level of algorithmic universal learning activities<FootnoteStart:>The part of the Russian Federal Educational Standard.<FootnoteEnd:>. To solve the tasks in this module correctly, pupils must understand how sequences work (one or more rules).
Modelling	6	This module measures the ability to translate models represented with words or geometric sequences into mathematical formulations. As in the Patterns and Sequences module, these items also measure pupils' level of algorithmic universal learning activities. However, students are required here not only to recognize the model but also to represent it using formal mathematical notation.
Data handling	5	The tasks evaluate children's ability to comprehend and interpret information from charts and graphs. In addition, pupils must understand how to perform computations using graphic information and make judgments with additional information.

ics, language, reading comprehension, and vocabulary. Measurements are performed as computerized adaptive testing.

PROGRESS-ML is designed to evaluate how well students perform in mathematics after two years of schooling. In today's postindustrial world, mathematics education must prepare students to solve problems in ever-changing environments, e. g. make quick decisions and adapt to new situations, be able to solve unfamiliar problems and navigate easily in large quantities of information. All of this transforms the concept of basic mathematical literacy. For instance, such literacy comes to involve a broader range of skills due to the increased number of data handling or problem solving contexts. The test was designed around the following definition: "Basic mathematical literacy (including data handling) is the ability to apply mathematical knowledge, reasoning, and models to real-world problems, including those in digital environments" [Froumin et al. 2018].

Table 2. **Cognitive domains evaluated in the PROGRESS mathematics test**

Cognitive domain	Number of items	Description
Knowing	12	Covers the knowledge of mathematical facts, which is fundamental to solving any problem. For example, students may be asked to add or subtract two whole numbers, estimate the height of a column in a simple histogram, or calculate how many times a geometric shape can be fitted into a picture.
Applying	14	Focuses on the ability of students to apply the acquired knowledge and skills to solve problems or situations with well-known contexts and solution algorithms. For example, a problem may ask for the rule behind a number sequence or a shape pattern.
Reasoning	4	The tasks require careful analysis of the information given in the problem in order to connect facts from different content areas and consider alternative solutions. These items use unfamiliar contexts and thus require more focus.

The test is comprised of 30 dichotomous multiple-choice items. Items were selected to meet the definition of basic mathematical literacy and at the same time make allowance for the elementary school curriculum. As a result, five content areas were identified (Table 1), and all the items were grouped into the respective modules.

Furthermore, PROGRESS-ML evaluates students' cognitive processes that are necessary to solve the tasks. The test was designed in accordance with the three cognitive domains identified within the theoretical framework of the TIMSS fourth-grade assessment [Harris, Martin 2013]: knowing, applying, and reasoning. At the same time, the test items were designed to fit the Rasch model.

The TIMSS taxonomy of cognitive domains is similar to Bloom's taxonomy of educational objectives [Bloom 1956], yet it is not identical to it and identifies only three domains, not six. Besides, a fundamentally distinctive feature of the TIMSS taxonomy is that the three cognitive domains are not ranked by difficulty or degree of abstractness, so each domain has tasks of varying difficulty.

Problem solving in PROGRESS-ML involves all the three cognitive domains of the TIMSS taxonomy. Most of the tasks are distributed approximately equally between the domains of Knowing and Applying, while the remaining small portion of items targets Reasoning[6] (Table 2).

Some of the PROGRESS-ML tasks (about 50%) can be regarded as reading-intensive, as students are supposed to read and understand the problem setting.

[6] The correctness of classifying the items under the three cognitive domains was verified by experts.

Therefore, PROGRESS-ML is a structurally complex measure that covers five content areas and evaluates three cognitive domains. Such measures are called composite and imply reporting the total score on the test (in this case, basic mathematical literacy) as well as the subscores (in this case, for content areas and/or cognitive domains).

3. Psychometric Properties of Composite Measures

Psychometric analysis of composite measures involves a few steps. First of all, it is necessary to examine whether the test is essentially unidimensional. If yes, then it is safe to report the total score on the test (given that it has been proven to be valid and psychometrically sound). If the test is not unidimensional, then multidimensional models should be used; in this case, the total score cannot be reported until a secondary analysis with hierarchical models is conducted [Schmid, Leiman 1957]. Two types of hierarchical models are especially popular: bifactor models [Reise 2012] and higher-order models [Gignac 2008]. Although both types of models have some algebraic similarities and imply reporting the total score on the test, solutions of these models are interpreted in different ways [Rijmen 2010; Mansolf, Reise 2017]. Higher-order models measure the general factor which is manifested in subscores, while bifactor models separate the effects of the general factor from those of subscores.

If the test is designed to report subscores (e. g. scores in specific content areas or cognitive domains) in addition to the total score, three approaches to modelling are possible. The first one consists in applying a unidimensional model to each subscale individually [Davey, Hirsch 1991]. However, subscales do not normally contain many items, so this results in compromised reliability and unacceptably high measurement error. Under such conditions, subscore reporting appears to be inappropriate [American Educational Research Association, American Psychological Association, National Council on Measurement in Education 2014].

The second approach is based on between-item non-compensatory multidimensional item response models [Reckase 2009]. Such models bring together a few unidimensional models in a single likelihood equation. Each latent trait of a variable is estimated based on examinees' answers to specific items only, controlling for the correlations among the latent variables. Therefore, multidimensional models use the information from each dimension to model the probability of item responses not as a function of a single latent variable but as a function of a multidimensional latent distribution of respondents (they consider correlations among latent dimensions). As a result, measurements will be more reliable than with the previous approach, adding more value to subscore reporting. Between-item non-compensatory multidimensional item response models can be used in analysis of collateral information, i. e. any information about the test, examinees, or relations between them which does not affect parameter interpretation

when added to the model but allows reducing uncertainty in parameter evaluation [Wang, Chen, Cheng 2004].

The third approach uses bifactor models. Hypothetically, they allow reporting total scores together with subscores as supplementary and independent information. However, studies show that subscores obtained using bifactor models tend to lack reliability as they describe information which was not extracted using the total score and thus often capture random noise in the data [Haberman, Sinharay 2010].

To summarize, data from composite measures cannot be used without prior psychometric analysis to ensure reliability and reportability of the total score and subscores.

3.1. Research Methodology

3.1.1. Sampling and Procedure

The study was conducted on a regionally representative sample of 6,078 third-grade pupils from two regions of Russia. The average age of pupils was 9.06 (SD = 0.46); girls accounted for 52.36% of the sample. Computer adaptive testing with a stopping rule was administered to the sample.

3.1.2. Data Analysis Methods

Psychometric analysis was performed entirely within the framework of Item Response Theory (IRT) [van der Linden 2018]. IRT postulates that items as well as examinees have some latent parameters, the interactions among which determine the probability of observing a correct response of each examinee to each item. Specifically, analysis was done through Rasch measurement modelling [Rasch 1993], which posits that items only differ in their difficulty, compared to other IRT models that use more item parameters [Wright, Stone 1979]. The specific objectivity (that guarantees separation of the parameters of items and examinees, a clear hierarchy of items along the entire continuum of ability, and numerical stability of models) justify the selection of Rasch models for psychometric analysis in the present study.

An important advantage of Rasch models is that they allow assessing the variance of latent abilities (random effects) [Kamata 2001]. In case the variance of an ability approaches zero, this ability does not load on the items enough to affect the probability of item responses. Besides, just as all multidimensional IRT models, Rasch models allow estimating directly the correlations and variances of latent abilities "cleansed" of random error variance in the distribution of scores across the items [De Boeck, Wilson 2004].

Unidimensional and multidimensional models were used in the present study to test a series of hypotheses about possible latent abilities required to solve the tasks.

The Rasch unidimensional measurement model [Wright, Stone 1979] was used to test the hypothesis that the total score on the test can be safely reported to individuals. Test dimensionality was analyzed by applying principal component analysis (PCA) to standardized model residuals, which represent standardized deviations of responses from values expected under the employed model [Linacre 1998; Smith 2002].

Thereby, the variance unexplained by the model is decomposed into components. In theory, if the unidimensionality assumption is confirmed, correlations among the residuals should be close to zero. In this case, PCA will not extract components that systematically explain more variance than others. Hence, the distribution of the variance explained by the components will be close to uniform. It is also generally accepted that if the eigenvalue of the component explaining most of the variance is less than 2, the distribution of residuals captures random noise and the test is thus unidimensional [Linacre 2021]. Otherwise, the test has more than one dimension.

The item fit was assessed using unweighted (OutFit) and weighted (InFit) mean square (MnSq) statistics [Linacre 2002]. These statistics are also based on standardized residuals [Wright, Masters 1990] and have an expected value of 1. The present study considers the acceptable range of fit statistics to be (0.75; 1.33), which is treated in research literature as a range productive for measurements [Adams, Khoo 1996].

Finally, psychometric soundness of the total test score was assessed by measuring its reliability and measurement error.

The hypothesis on the importance of reading skills in solving mathematical problems was tested using within-item compensatory multidimensional models [Adams, Wilson, Wang 1997]. Such models imply that more than one latent ability is required to solve any task (e. g. mathematics and reading skills), and linear combinations of such latent traits modulate the actual probability of item responses.

Fifteen most reading-intensive items were selected to assess reading skills. Next, an incomplete bifactor Rasch model was calibrated, which allows that mathematical literacy is measured by all the items while a selected group of items additionally measures reading comprehension. This model can be regarded as an extended Rasch testlet model [Paek et al. 2009], an oblique bifactor IRT model that allows direct estimation of correlations between two latent abilities. Therefore, the primary dimension that loads on all the items can be interpreted as basic mathematical literacy "cleansed" from the contribution of reading. At the same time, the additional ability that loads on the selected 15 tasks can be interpreted as reading skills that are manifested in the basic mathematical literacy test.

Finally, the subscore reporting hypothesis was tested using Rasch between-item non-compensatory multidimensional models [Adams, Wilson, Wang 1997], which imply that each item belongs to only one particular subscale and there is no general factor. The preference of a between-item model in the present study has to do with criticism against general factor models, in particular because the subscores obtained in such models are difficult to interpret. For a bifactor model, this involves low subscore reliability and constraints imposed on the variance–covariance matrix of latent variables that make interpretation of any obtained scores challenging [Bonifay, Lane, Reise 2017]. At the same time, higher-order models do not use subscores at all be-

cause the key information about the construct components is already described by the general factor.

Goodness of the global fit of all models described above was compared to that of the Rasch unidimensional model, which served as the baseline. The global fit was assessed using the Akaike Information Criterion (AIC) [Akaike 1974]) and the Bayesian Information Criterion (BIC) [Schwarz 1978]. These information criteria include a penalty for extra-parameters (AIC) with respect to the sample size (BIC). They estimate the relative quality of models, the ones with the lowest values being preferred. Local fit was assessed using the OutFit and InFit statistics described above.

Reliability of all the models was assessed using expected a posteriori (EAP) estimation of ability [Bock, Mislevy 1982]. The EAP method works particularly well with multidimensional measures as it utilizes information about the multidimensional ability distribution as well as the entire patterns of item responses to measure ability along each dimension. The use of EAP in this case is justified because the instrument is not designed for the analysis on particular dimensions separately without using the other ones. Therefore, the use of multidimensional IRT models in this context involves a different understanding of collateral information. In this case, for each subscale, data from all the other subscales (included in covariance matrix of the latent variables) represents collateral information [Wu, Tam, Jen 2016]. As a result, measurement reliability improves. The posterior standard deviation can be treated as the standard error measurement. The ultimate reliability is determined by the ratio of this error variance to the estimated latent ability variance [Adams 2005].

All the models applied can be regarded as special cases of the Multidimensional Random Coefficients Multinomial Logit Model [Adams, Wilson, Wang 1997]. All the models were estimated using a Quasi-Monte Carlo algorithm in the TAM package (version 3.5–19) [Robitzsch, Kiefer, Wu 2020] for *R* (version 3.6.2) under the Marginal Maximum Likelihood estimator, which makes a parametric assumption about (multidimensional) normality of the ability distribution [Bock, Aitkin 1981]. All the models were identified by keeping the sample mean at zero for each dimension. This is especially important when identifying within-item multidimensional models. Dimensionality was assessed using the 'psych' package (version 1.9.12.31) [Revelle 2020]. Residuals were evaluated using the parameter estimates obtained by Warm's weighted maximum likelihood estimation [Warm 1989], which has proved to be less biased than other methods for ability point-estimation that are popular in IRT.

4. Results

4.1. Testing the Total Score Reporting Hypothesis

Table 3 displays the results of testing the conformance of items to the unidimensional Rasch model. All the items show a reasonable fit with goodness-of-fit statistics staying within the acceptable range.

Table 3. **Testing the conformance of items to the unidimensional Rasch model.**

Module	Item	Number of responses	Difficulty	SE	InFit MnSq	OutFit MnSq
Spatial concepts	I01	6,041	–1.18	0.03	0.97	0.96
	I02	5,975	–0.56	0.03	1.03	1.04
	I03	5,997	–0.23	0.03	1.05	1.06
	I04	5,430	0.37	0.03	1.04	1.06
	I05	4,987	0.69	0.03	1.00	0.99
	I06	4,125	1.19	0.04	1.08	1.14
	I07	3,098	1.94	0.05	0.98	0.97
Measuring	I08	5,843	–1.51	0.03	1.07	1.13
	I09	5,860	–1.47	0.03	1.03	1.05
	I10	5,811	–1.69	0.04	0.95	0.88
	I11	5,626	–0.76	0.03	1.02	1.01
	I12	5,375	–0.65	0.03	0.93	0.89
	I13	5,080	–0.59	0.03	0.95	0.92
Patterns and sequences	I14	5,560	–2.41	0.05	0.95	0.87
	I15	5,473	–2.06	0.04	1.02	1.04
	I16	5,340	–1.42	0.04	0.96	0.92
	I17	5,009	–1.16	0.03	1.00	1.03
	I18	4,755	–0.56	0.03	1.06	1.07
	I19	4,398	–0.12	0.03	1.03	1.04
Modelling	I20	4,603	–0.62	0.03	0.98	0.98
	I21	4,263	–0.41	0.03	0.89	0.86
	I22	3,826	–0.37	0.04	1.10	1.14
	I23	3,013	1.78	0.05	1.04	1.11
	I24	2,423	0.72	0.05	1.06	1.12
	I25	1,702	0.73	0.05	1.00	1.01
Data handling	I26	2,808	–2.31	0.06	0.98	0.98
	I27	2,469	–2.20	0.06	0.93	0.83
	I28	2,320	–1.35	0.05	0.89	0.83
	I29	1,969	–1.60	0.06	0.88	0.76
	I30	1,708	1.05	0.06	0.95	0.93

Table 4. **Comparing the baseline model with the model evaluating the contribution of reading comprehension.**

Model	Log-likelihood	Sample size	Number of parameters	AIC	BIC
Unidimensional	144,255.6	6,078	31	144,318	144,526
With reading comprehension as a latent dimension	142,638.5		33	142,705	142,926

PCA of model residuals reveals that the eigenvalue of the first component is 1.45, which accounts for 4.2% of the residual variance. The eigenvalues of the following four components fall within the range of (1.15; 1.20), and the variance is distributed approximately uniformly among the principal components (about 4%). Consequently, the unidimensional model describes the distribution of response probabilities adequately and the test can be treated as unidimensional.

The EAP reliability of the unidimensional model in measuring mathematical literacy equals 0.76 (ability variance = 0.93); Cronbach's alpha is 0.81, which is fairly high.

Therefore, the test can be considered unidimensional based on the above analysis even despite different methods of item grouping, which means that the total score on the mathematical literacy test can be reported as psychometrically stable.

The unidimensional Rasch model served as the baseline for comparing all the other models.

4.2. Testing the Hypothesis about the Contribution of Reading Skills

Table 4 shows the results of comparing the unidimensional Rasch model with the Rasch model calibrated for measuring the contribution of reading skills in the probability of item responses.

The model measuring the contribution of reading comprehension looks more preferable in terms of global fit. However, the variance of reading skills is only 0.02, which is 52.35 times lower than that of mathematical literacy (0.89) from this model. Similarly, the reliability of mathematical literacy was found to be 0.75, which is 41.83 times higher than that of reading comprehension (0.01). Consequently, examinees do not differ in the latent ability measured by the selected 15 items. Furthermore, Pearson's correlation coefficient between the dimensions of reading skills and mathematical literacy is insignificantly different from zero ($r = 0.01$, $p > 0.05$, according to the *t*-test for Pearson's correlation), contradicting previous findings (e. g. [Grimm 2008]). The reason may consist in low variance and, as a result, low reliability of reading skills measurement: with such reliability and variance values, differences in examinees' reading skills are almost entirely attributable to random fluctuations. Based on the results of analysis, one may say that reading comprehension may contribute to scores in this

Table 5. **Comparing the unidimensional Rasch model with the Rasch models for content areas and cognitive domains.**

Model	Log-likelihood	Sample size	Number of parameters	AIC	BIC
Unidimensional	144,255.6	6,078	31	144,318	144,526
Content areas	143,875.7		45	143,966	144,268
Cognitive domains	143,965.4		36	144,037	144,279

Table 6. **Reliability, variance, and correlation coefficients for the content areas model.**

Dimension (content area)	Spatial concepts	Measuring	Patterns and sequences	Modelling	Data handling
Spatial concepts		0.85	0.80	0.83	0.80
Measuring			0.85	0.90	0.83
Patterns and sequences				0.86	0.84
Modelling					0.83
Variance	0.89	1.23	1.12	1.06	2.95
Reliability	0.68	0.71	0.67	0.68	0.63
Number of items	7	6	6	6	5

test just as in other instruments, but the contribution is so small that it is essentially unidentifiable.

4.3. Testing the Subscore Reporting Hypothesis

Table 5 shows the results of comparing the unidimensional Rasch model with the Rasch models calibrated for validating the theory-based content areas and cognitive domains.

Data from Table 5 indicates that either of the two concurrent models fits data better than the unidimensional model. Consequently, the taxonomy behind test design actually guides the examinees towards expected behavior.

The results of analyzing the variance–covariance matrices and reliability coefficients for each dimension of the models applied are given in Tables 6 and 7.

The coefficients in Table 6 allow concluding that, firstly, reliabilities of all the dimensions are sufficiently high for using the test as a longitudinal survey instrument. Despite the small number of items, the basic mathematical literacy test can be used for longitudinal assessments thanks to the reliability analysis method (EAP estimation of ability) applied under multidimensional model. Secondly, all the content areas correlate with one another at approximately the same level (0.8–0.9),

Table 7. **Reliability, variance, and correlation coefficients for the cognitive domains model.**

Dimension (cognitive domain)	Knowing	Applying	Reasoning
Knowing		0.95	0.85
Applying			0.85
Variance	1.37	0.82	0.60
Reliability	0.75	0.74	0.61
Number of items	12	14	4

adding to the argument for unidimensionality even though the multidimensional model fits the data statistically better. These results indicate that items from every content area load equally on the general factor of mathematical literacy.

A similar inference can be made about the model assessing the validity of cognitive domains (Table 7): reliabilities of the dimensions are sufficiently high for using the test as a longitudinal survey instrument. It is worth focusing on the reasoning dimension which consists of four dichotomous items only. Such a small number of items basically makes raw subscores on this scale unreportable, unlike the scores on this latent dimension. Analysis of the correlation matrix of cognitive domains also supports the hypothesis about the test being essentially unidimensional.

5. Conclusion

Social sciences have been using increasingly more often composite measures, which imply reporting the total score as well as subscores. One of the possible strategies of applying the measurement results obtained with such instruments could consist in reporting raw subscores [Wilson, Gochyyev 2020]. However, psychometric analysis is required to find out how much value raw subscores add to the total score [Haberman 2005]. In most cases, raw subscores are not psychometrically sound, in particular due to their low reliability [Haberman, Sinharay 2010].

Another, more popular strategy suggests using complex psychometric models that are often difficult to interpret [Bonifay, Lane, Reise 2017]. This primarily applies to bifactor models: the estimation of their parameters requires essential, sometimes unrealistic assumptions that make it extremely hard to interpret the test results [Wilson, Gochyyev 2020]. Even with the recent advances in oblique bifactor models, it is still a long way to developing a single framework for their interpretation and completing the analysis of their psychometric

properties [Kanonire, Federiakin, Uglanova 2020]. Yet another strategy consists in using higher-order models [Gignac 2008], in which subscores work as indicators of the general factor. However, such models do not imply subscore reporting at all, which limits their applicability without belittling their academic value.

Subscores are in high demand among practitioners as they not only measure the level of performance on a construct but also describe how exactly it was achieved. To meet this demand, researchers involved in international school student assessments use the fact that a person's mean score across all the subscales in a multidimensional model is equal to their score in a unidimensional model, provided that subscales undergo linear transformation into scales with identical numerical parameters (for example, with the mean of 500 and SD of 100) [Foy, Yin 2015]. This allows researchers to avoid restricting the interpretation to a single model and avoid the use of overparametrized psychometric models [Brandt, Duckor, Wilson 2014].

A similar strategy was used to report scores on the PROGRESS-ML mathematical literacy test. To provide justification for using the total score, the items were tested for unidimensionality using PCA of model residuals and goodness-of-fit statistics. Results indicate that the test can be used as a unidimensional measure, which means that the overall mathematical literacy score can be safely reported to end users.

Next, the reportability of subscores in addition to the total score was tested. Since mathematical literacy is a complex multicomponent construct, its subscores have added value for end users. Subscore reportability was assessed to enhance the applied value of test results in compliance with the Standards for Educational and Psychological Testing [American Educational Research Association, American Psychological Association, National Council on Measurement in Education 2014]. Item recalibration in other models — the most suitable approach for this measure — showed that subscores obtained on the construct components are psychometrically sound and can be reported to end users.

Therefore, the total score is the key result of the test. However, additional item recalibrations across the content areas and cognitive domains allow describing how exactly the overall score on the test was achieved. In fact, the total score is decomposed into its components. Information about correlations among the subscores makes it possible to use even relatively small scales (e. g. the 'Reasoning' scale from the model for cognitive domains consists of four items only) with fairly high reliability.

In addition, the contribution of reading skills in the probability of item responses was assessed. Expert evaluations were used to measure the reading intensity of items, allowing to identify the second potential dimension and evaluate its variance and correlation with the primary dimension. Reading comprehension was found to make no significant contribution to the probability of item responses. The approach tested in the present study has a great potential for generali-

zation and can be used to analyze the contribution of nuisance dimensions in other measures.

This article describes the psychometric properties of the PROGRESS-ML basic mathematical literacy test. A three-stage analysis showed that (i) this test can be used as a unidimensional instrument, i. e. its total score can be reported to end users; (ii) reading comprehension does not contribute significantly to the probability of item responses; and (iii) subscores obtained on test components can be reported to end users in addition to the total score.

The reported study was funded by the Russian Foundation for Basic Research (RFBR) as part of research project no. 19–29–14110.

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Psychometric Properties of the Russian-Language Version of the Early Parental Attitudes Questionnaire (EPAQ) Designed to Assess Intuitive Theories of Parenting

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Received in September 2020

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Abstract

Psychometric properties of the Russian-language version of the Early Parental Attitudes Questionnaire (EPAQ), an instrument for assessing intuitive theories of parenting, were tested on 1,928 parents of children aged 1–7. Assessment of the questionnaire's reliability (internal consistency) using the Cronbach's alpha coefficient showed that the scales were not homogeneous. Confirmatory factor analysis revealed that the data obtained in the Russian sample was only partially consistent with the original three-scale model obtained in American parents. The questionnaire's factor structure, determined using the exploratory factor analysis, was interpreted from the perspective of the adults' beliefs on parenting and child development that are widespread in Russia. Additional adaptation is needed to improve the reliability of the Russian-language version of the questionnaire and to allow its further use.

Keywords

preschool children, intuitive theories of parenting, parent-child-relationship, rearing, learning, cultural differences.

For citing Bukhalenkova D. A., Veraksa A. N., Gavrilova M. N., Kartushina N. A. (2021) Testirovanie psikhometricheskikh svoystv russkoyazychnoy versii oprosnika EPAQ dlya vyyavleniya intuitivnykh teoriy vospitaniya u roditeley [Psychometric Properties of the Russian-Language Version of the Early Parental Attitudes Questionnaire (EPAQ) Designed to Assess Intuitive Theories of Parenting]. *Voprosy obrazovaniya / Educational Studies Moscow*, pp. 227–242. https://doi.org/10.17323/1814-9545-2021-2-227-242

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Edutainment Centers as an Educational Phenomenon: The Case of KidZania

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Received in October 2020

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Abstract

Edutainment centers, i. e. centers that both educate and entertain, have sprung up across the globe since the 1970s. At the end of the 20th century, a new type of such centers emerged: interactive cities for children, KidZania being the first of its kind and the most global one. Through the example of KidZania, this study examines the characteristics of interactive cities that have made them popular among children and their parents as well as the role of such parks in today's urban learning ecosystems. The paper also explores how the relationship between entertainment and education and the one between the commercial and educational components of edutainment centers affect the current state and development prospects of the sector.

Keywords

learning ecosystem, edutainment, edutainment center, KidZania, learning environment, interactive city.

For citing

Graus G., Kosaretsky S. G., Kudryavtseva A. A., Polivanova K. N., Sivak E. V., Ivanov I. Yu. (2021) Edutainment tsentry kak obrazovatelny fenomen. Keys KidZanii [Edutainment Centers as an Educational Phenomenon. The Case of KidZania]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 2, pp. 243–260. https://doi.org/10.17323/1814–9545–2021–2–243–260

The last third of the 20th century was marked by the emergence of theme parks (e. g. Legoland), science museums (e. g. Boston Children's Museum, Cité des Sciences et de l'Industrie), and other centers combining education and entertainment — the so-called edutainment centers — across the world's major economies. Edutainment is defined as activities that bring together learning and gratification of curiosity, whereby learners actively acquire knowledge and experience. Edutainment characteristics include illustrative substantiation of the value of knowledge, independence in the learning process, learning through play and visual stimulation, a friendly environment, and flexibility of interactions. Edutainment centers are becoming an important element of the service sector and the economics of impressions, shaping a new image of modern urban environment for local population as well as tourists.

At the end of the 20th century, a new segment of the edutainment industry emerged: interactive cities for children. They are classified as location-based edutainment with a strong commercial element: different careers are illustrated through the example of specific businesses which present their products or services [Rusman, Ismail 2020].

Even though Russia's first edutainment center — the House of Entertaining Science — was established by the Soviet authorities in the 1930s, it was only in the 2010s that this sector began to gather momentum. As of today, Russia has over 90 science museums and over 40 interactive cities of varying size and quality [Kosaretsky, Kudryavtseva, Fiofanova 2018].

There has been a consistent demand for edutainment services. However, research on edutainment centers and interactive cities in particular is very scarce and mainly focused on the business models of such centers and the factors of their economic success. While visiting education centers, children experience consumer socialization by gaining product and brand knowledge, shopping knowledge and skills (shopping scripts), retail store knowledge, and transaction knowledge. There is a shift in brand preferences toward the sponsored brands [Arthur, Sherman 2016]. Theme park experiences are analyzed from a symbolic interactionist perspective. Success of such parks is understood as their ability to induce positive emotions by means of scripted interactions, behavior control, atmosphere design, and spatial design [Cabanas 2020]. Studies exploring KidZania as the best-known interactive city and its commercial success attach specific importance to its global reach and adaptation of the original concept to local cultural contexts [Di Pietro et al. 2017]. KidZania is regarded as a modern multilevel service ecosystem that involves children and families, employees, investors, franchisees, industry partners, schools, governments, and local communities. The KidZania business model is two-fold: on the one hand, it is a family and schools edutainment center where kids role-play and can get a sense of life as an adult. On the other hand, KidZania is a new marketing media for brands [Lonsway 2016]. The in-

Translated from Russian by I. Zhuchkova.

terplay of learning and entertainment in the KidZania model is interpreted as a factor increasing customer loyalty and visitor engagement [Marsh, Bloom 2014]. KidZania enfolds immersive environment design, leveraging environmental immersion as an "interactive publicity" opportunity for companies who partner with KidZania and creating emotionally profitable spatial experiences for children.

The question about what exactly could be the educational component of edutainment centers has been rarely addressed in research literature and debate so far. There are few publications thoroughly exploring KidZania's potential as a specific format of education or practices to actualize that potential. KidZania is described as an informal learning environment in which children can practice various skills. Some researchers believe that skills learned in KidZania, such as money management skills, have the same value as those learned in school. Studies examining KidZania as a learning format discuss the advantages and limitations of learning in such environments and analyze the characteristics of play as a learning medium as well as the balance of free and supervised play [Cabanas 2020; Tagg, Wang 2016].

This study provides a detailed analysis of the educational potential of edutainment centers using the data on KidZania as the first, the largest, and the most global edutainment center. The fundamental components of the KidZania business model and concept have been borrowed by other interactive cities (Kidlandia, Minopolis, and others).

Founded in 1999 by Xavier López Ancona and Luis Javier Laresgoiti, KidZania is currently a franchise. KidZania parks for children aged from 4 to 14–16 now operate all around the world: in the UK, Saudi Arabia, Kuwait, Indonesia, Japan, etc.

KidZania represents a complex of role-play locations, or establishments, that are dedicated to specific activities and professions (airlines, bank, plant, etc.), each with a thematic setting. As envisioned by the creators, every KidZania park is themed as a country with its own history and attributes: national flag, government, currency, economics, traditions, and a common system of values including the rights "to Be, to Know, to Create, to Share, to Care, and to Play". Children become citizens of the "country": they receive a passport, "work" (take part in role-play games in various locations, where they learn how the city and businesses are organized), get a sense of different careers, pay taxes, make purchases, open bank accounts, etc. They also engage in scripted activities, "official" (e. g. a parade) or "spontaneous" (e. g. a fire).

Analysis of the educational potential of interactive cities is performed in this article to answer the following questions:

- Which skills and experiences are interactive cities focused on in the first place, and which tools and practices do they employ for that purpose?
- What role do such centers play in the learning environments of present-day urban children?

Various sources of data are used to consider the perspectives of different stakeholders and examine the practices used in KidZania: the concept description from KidZania's official website — to analyze the center's officially stated vision and mission; observations in KidZania parks — to analyze the tools and practices used; interviews with parents of interactive city visitors and with KidZania staff members — to get a sense of the meanings that they attach to visiting the park; and quantitative data on the popularity of different establishments within the park — to get the idea about children's experiences and their limitations.

Theoretical Framework

Analyzing how edutainment centers fulfill their educational function involves solving two problems:

- Examining the educational potential of edutainment centers;
- Providing a rationale for including edutainment centers as organized experiences into the learning environment—"an environment of personality development opportunities" [Froumin, Elkonin 1993].

It would not be unreasonable to discuss edutainment centers' educational potential and its characteristics within the framework of theories interpreting education in the categories of experiences and emotions rather than restricting it to knowledge acquisition. Theoretical framework of the present study relies upon the works of John Dewey, who approached learning as a continuous process of reconstruction of experience. He also argued that the educator must first of all arrange the conditions for students' fruitful experiences, underlining the importance of students' active participation in the formation of such experiences. An experience is a practical activity or an observation establishing the relationship between an individual's actions and their consequences [Dewey 2000]. Dewey attached a lot of attention to experiences in the process of learning, in particular to the role of positive emotions in the formation of experiences and the methods of inducing them.

In Russian literature, a similar role is assigned to the concept of trying (*proba*), to which Elkonin and Polivanova assign the critical role in child development. Trying is understood as safe and reversible activities [Polivanova 2000] that allow children to role-play behaviors in a quasi-real environment, "experience" their own actions, and try themselves. Trying is the foundation of subjectivation as the process of becoming a subject and internalizing an ability. The best part of KidZania's educational content could possibly be determined by providing children with the opportunity to try themselves in different quasi-professional contexts.

Edutainment center visitors engage in new experiences through play in controlled or scripted situations. Scripts set the context, making

visitors face realistic action choices. Emotional state of visitors is a special focus of edutainment center designers. Edutainment practices are designed to attract visitors, induce positive emotions, maintain children's attention, and stimulate their natural curiosity through emotion. Researchers regard theme parks as paradigmatic and representative examples of emotional environments [Chytry 2012; Newell 2012], i. e. environments in which emotions play the decisive role in understanding the material and symbolic content of the environment and determine the patterns of individual behavior and communication practices.

Our analysis of the role of edutainment centers in the learning environment is also premised on the contemporary learning environment theories and the ecosystem approach, which postulate that education is not restricted to traditional formal institutions such as kindergarten or school and interactions with professional educators. Children learn in the "environment of organized experiences, not organizations"—which are more or less structured, specifically arranged, and clearly distinguishable [Froumin, Kosaretsky, Leshukov 2016; Polivanova et al. 2020].

Methods

KidZania's publicly accessible constitutional documents were analyzed and interviews with four KidZania managers were conducted to identify the conceptual foundations of the KidZania model and operation practices. Overt observations were performed to examine how interactions between children and staff members are organized, with due consideration of scripts (interaction algorithms), the role of supervisors, and the use of job-specific equipment and tools. Training courses for KidZania supervisors were attended to get a better sense of the methodology behind experience design.

Semi-structured interviews with 15 parents were conducted to describe their expectations and attitudes regarding their children's experiences in KidZania. The interview results were processed using the method of thematic analysis.

Results

Analysis of the data collected allows identifying and describing two categories of KidZania's key characteristics that determine its role in the learning environment: values / value orientations and means of achieving them.

Judging by KidZania's constitutional documents and interviews with its representatives, KidZania activities are designed to provide children with knowledge and experience that can be applied in learning and daily life. Emphasis is placed on financial literacy, strategies of spending the money earned — shopping, saving, charity — and the idea of relevant institutions. One of the tools to develop financial literacy is KidZania's policy on "salaries" that children are paid for "working" at the establishments.

"Our 'salaries' are not very high: if a kid wants to buy a toy vehicle, they will have to come a few times. This is not frugality; this is our philosophy to make them understand that money is hard to make. [A child] also becomes a bit more serious, knowing that they have to earn and save money. About 60–70% of children make savings — and that's financial literacy and understanding how everything works."[1]

KidZania's practices are also oriented toward developing civic literacy in children, who learn the city's laws, receive and use their own passports, pay taxes, and perform other civic duties through role play. Because the concept of KidZania is invariant across the cities and countries, it basically conveys the orientation toward the global values of openness, nonviolence, etc.

Obviously, realistic attributes of different professions and role-playing of various jobs indicate KidZania's great career guidance potential. KidZania offers a very broad range of careers, which is updated on a regular basis, expanding children's awareness beyond what they see in their immediate surroundings or learn at school. However, KidZania staff members protest against classifying the park as a career guidance center. Assistance with career choices is not considered a priority. Children learn about professions and develop certain attitudes toward them, but this is not regarded as intended or controllable effects. KidZania representatives point out that most visitors are under 12 years of age, which is too early for career counseling; besides, occupations represented in the park are mostly traditional — police officers, firefighters, and doctors — so career guidance opportunities are quite limited. Finally, positioning of KidZania as a career guidance center may affect parents' interest for particular establishments or the park in general, thereby reducing children's opportunity to have adult-like experiences. The range of professions is also restricted by the KidZania business model to the ones that are in demand among sponsoring brands.

> "You know, few parents will be happy if their child wants to become a police officer after visiting KidZania."

Immersion in real-life jobs, or rather in the context of employment as such is approached by KidZania creators as a means of solving the more important tasks of socialization and moving into adulthood. Professional as well as financial and civic activities are social practices that are part of becoming an adult; participation in them develops relevant experience as well as decision-making, cooperation, and communication skills.

> "I would say that the key skill children acquire here is the one of making choices, I mean understanding exactly what they want. <...> For

[1] Citations here and elsewhere in this article are taken from the interviews with KidZania staff members. .

> me, KidZania <...> is about making decisions in specific contexts: where to go, whether to spend or earn money, or maybe make savings to buy something later at the department store."

KidZania representatives emphasize that those adult-life experiences are adapted for children and made easier and safer ("We have no ambition of making adults out of them; we don't place all the burdens of responsibility like mortgage or bosses upon them")—just as safe and adapted as establishment activities ("you cannot melt real ore [at the metallurgical plant]"). The center's goal is to introduce children into adulthood by allowing them to role-play and try themselves at making independent decisions in a safe environment. As a result, children acquire knowledge about the "adult life" and get a sense of how it works by learning different ways of earning money and making their first decisions on how to use it.

Both the underlying concept of "citizens of an adultless city who make political decisions" and the particular activities in different career environments are designed to develop children's sense of autonomy and provide them with experience of successful problem solving.

> "And you do actually believe that you belong there, everything's made just for you, and you're a cool self-sufficient adult who is separated as much as possible from your parents. You've got your own money that you can spend or save or, I don't know, present your earned toy car or doll to someone else."

> "This is where you decide what to do and where no one seems to influence your decisions."

> "[A child has a chance] to try things, to feel independent, and to listen to what they actually want and to what extent they are ready to insist on where they want to go or why they want to go there."

Of major significance is experience of success, when

> "they do something themselves: they are not made or taught to do it, but they are told about how it works in real life and they do it on their own, and they most probably succeed."

> "New knowledge about oneself and the world around is exactly about edutainment, learning through play and positive emotions. It's about being happy and experiencing success. This is indeed what matters the most; <...> it is highly important that a child gains something and experiences a wow effect."

KidZania's major instrumental attributes include realistic environment, play, interactivity, supervision, and elaborated scripts.

Realism is achieved by designing the park as a city with the basic elements of an urban environment: government office, central square, post office, bank, etc. Most of them also serve to simulate the career (employment) environment. A special focus is placed on realism, thoroughly elaborated design, and strong attention to detail. For example, locations may feature such "flagship" elements as an airplane fuselage, real vehicles, sett pavement, etc. When interviewed, KidZania representatives underlined that deliberate use of more expensive and better-quality materials than those of competitors is not just an indicator of a higher-end product but first of all a key prerequisite for immersive experiences. The physical design of the environment helps children grow into the roles of citizens or employees in a specific organization. Children fight real fires, cook real burgers, broadcast radio programs aired in the city, create cartoons, change tires on a race car, etc. Realism is essential for children engagement and as a source of positive emotions.

> "KidZania should leave people open-mouthed, which it actually does. Any child or parent should come and say, 'Wow! This is just… there's even the sky!' I mean, for me it's decisive, when there's even the sky."

Collaboration with brands helps achieve the desired degree of realism in the interactive city, where children can see the business signs and other brand components that they often come across in real cities.

Play is the key mode of existence in KidZania. All children's activities involve role-playing real jobs and imply active engagement, trying, and gaining personal experience.

> "When you don't only deliver the information orally but let the child press the button and ***gain*** something, their knowledge becomes more solid."

Children's activities in every location always involve interaction with other children playing different roles within the specific occupation. Children work as a team and perform team-oriented tasks. Even when they are given different tasks, they can see what others are doing.

Children's activities in the city in general and in locations in particular are controlled by specifically trained supervisors. When interacting with children, a supervisor must focus on the four effects that KidZania seeks to provide: new knowledge, positive emotions, the right values (different locations focus on different values, from politeness and mutual aid to caring about the environment), and experience of success (putting out a fire, making a pizza, removing an appendix). Supervisor's role is to administer the location-specific scripts as the duration of activities in every location is limited. However, supervisors should not ignore questions from children who show a keen interest in the profession.

Every child's visit to KidZania follows a script elaborated with due regard to the specific occupation. There are basic scripts for jobs offered across all KidZania parks, and when an occupation is restricted to one country, the script should be negotiated with the headquarters. Scripts are written by a team of staff members who visit the sponsoring businesses and get acquainted with the jobs offered by their production departments; after that, they adapt the scripts for children. Every script consists of the following steps:

- *Welcome*. Children are greeted and receive a security bracelet. Some children also have a KidZania passport, in which they receive stamps for participation in activities.
- *Acquaintance*. Every child tells their name, and the supervisor asks general questions, such as "How do KidZanians greet one another?" or "What kind of job do you want to try?"
- *Awareness assessment*. Supervisors asks a series of questions of increasing difficulty, such as "What does a/an [profession] do?", "What is the [profession attribute] for?", etc. and provides answers to the questions that children are unable to answer themselves.
- *Information sharing*. The supervisor tells about the profession using various visual aids.
- *Briefing*. The supervisor demonstrates what children will do and gives them safety instructions.
- *Independent work*. Children perform the tasks assigned by the supervisor under the supervisor's guidance. For instance, children who have chosen to role-play a race car technician will change tires, fill up a gas tank, and adjust the wing. Meanwhile, autonomy is limited by the script: children cannot do anything beyond the activities preplanned for the location. They engage in adult-like activities that are normally inaccessible to children outside KidZania—supervised, yet without direct assistance from adults.
- *Monitoring and feedback*. The supervisor checks the work done and collects feedback on children's understanding and knowledge assimilation by leading them into reflection with questions such as "What have you done today?", "Who have you been?" "What is [profession attribute]?" In addition, the supervisor asks children whether they have any questions.
- *Reward ("salary")*. Children earn "kidZos" (local currency) from completing most activities. However, there are some highly entertaining jobs that children should pay kidZos to try (e. g. the role of Secret Agent includes an assisted jump off a high building which is very popular among children).

Interviews with parents allow reconstructing their perceptions of KidZania opportunities and their own expectations from a visit to an edutainment center. Parents' statements provide a balanced representation of KidZania's educational and entertainment characteristics. Parents are

completely aware of the hybrid format of edutainment centers and understand that KidZania is not an institution offering extracurricular activities (ECA). Most parents value the educational component more than the entertaining one. Of all the learning opportunities provided by KidZania, parents give the highest priority to the development of soft skills, in particular autonomy and communication skills, and the opportunity to learn about a number of professions within a short period of time, which is normally impossible to do as part of a long-term oriented ECA program or may be challenging outside the specifically designed environment of KidZania.

> "A cooking workshop is about freedom and doing what is not allowed in my home kitchen."

> "They are granted autonomy, learn to communicate with adults and other children, and develop a sense of self-discipline."

> "Apart from getting some basic knowledge and information about a career, they also learn to get over the fear of speaking and presenting themselves, work in a team, and interact with other people who are of course all different. And then, they develop a sense of autonomy: when I had to go for a couple of hours, he stayed home alone — and that's where spatial orientation comes into play. He knows he's on his own and has to manage somehow."

> "For a child to understand that money doesn't come easy and you have to make an effort."

Parents harbor no illusions about the depth of knowledge or retention of skills acquired at an edutainment center.

> "I do realize it's a game. Many of those things are not as pleasant in the adult life which is full of routines. But kids can at least get the idea of what they might like."

Parents' expectations from KidZania are not focused on the outcome as it usually happens with school and often with ECA. Parents realize that learning in KidZania is about trying, not completing a process, and thus do not tend to examine it critically.

> "We come here for productive entertainment, not for critical evaluation."

> "Knowledge can be given at home but it will not be complete without experience. Experience is part of knowledge, so everything you know in theory should be supported with practice. Kids especially, they perceive the world through senses. Until they touch it and feel it, they

will never understand. Of course, they should try everything themselves at least in role play."

"It doesn't give 100% knowledge, naturally, but the strategy is just right and twenty minutes is just enough as children lose focus very soon. If it takes too long, they will get bored. Facts are delivered very well and supported by experiments, so kids get really involved. Within those 20 minutes, they get the very essence out of it. It's like a children's encyclopedia: one page per fact, no more. Of course, you can keep reading on and on, but it's enough to excite your curiosity."

Nevertheless, parents regard the knowledge and experiences gained in KidZania in the context of their children's future, as a tool for making study and career choices. Future implications are the top value in visiting KidZania for parents.

"I wanted to show him the opportunity to plunge into the world of professions, to understand how it works, to live through this experience. You'd better get a sense of what you wanna do in the early years, rather than grow up and have no idea about anything. When you already have the idea, you have more opportunities."

"Having tried everything, it will be easier to make choices and set goals in the future."

"Well, I hope, beside broadening the mind, a child will have an idea of different careers, and maybe it will help them avoid mistakes. Because sometimes parents want their kid to become something, or the kid wants to be, say, a firefighter by looking up to someone, and they obtain relevant education and then realize it's not what they want — just because they have no idea and no experience, they've never tried anything."

Conclusions and Discussion

Whatever perspective we take on the edutainment center — i. e. whether we examine its self-positioning, design of its activities, or parents' perceptions of its effects — experience remains its central component and most important value. KidZania seeks to create reproducible and script-controllable opportunities for new experiences in major thematic (financial literacy, occupation, civic engagement, charity) and meta-subject (communication, collaboration, autonomy) domains. Children gain unique realistic experiences associated with positive emotions, a clear sense of effort, and joy from achieving an outcome, even though in scripted role play. Tools for creating such experiences include conceptual spatial design of immersive environments, the use of play as the basis of any activity, and careful supervision focused on positive emotions, high expectations, role modelling, and positive feedback.

The specific value of experiences acquired in KidZania consists in their motivational potential, i. e. ability to spark interest and lay the foundation for further investigation into the subject or activity. However, a legitimate question needs to be answered: to what extent are experience quality and productivity affected by KidZania's control tools such as scripts, activity duration, and supervisor's techniques that limit children's free play and, consequently, their agency in constructing their personal experiences [Cabanas 2020; Tagg, Wang 2016]? Further research is certainly needed to get a better understanding of the phenomenon of experience and its role in children's education: both qualitative studies that assess children's perceptions of experience and quantitative ones to measure real short- and long-term educational effects in specific thematic domains.

KidZania's effectiveness in creating opportunity for experiences is what defines its role in the learning ecosystem of a modern city in the first place and attracts the target audience. Parents seek to provide their children with conditions conducive to various positive experiences. They realize the insufficiency of knowledge and skills taught in school and the limited potential of school — its learning environment, teaching methods, and teachers' attitudes — for securing children's all-round development, socialization, and adulting. They understand that school curricula remain narrow and formalized, i. e. test-oriented. Besides, they can see the school format failing to maintain curiosity, cognitive interest, and motivation in children. Today's families as well as the modern education system express a demand for developing and maintaining children's motivation for learning [Polivanova et al. 2020].

Parents are on the outlook for opportunities to provide their children with new experiences outside school, in particular as part of ECA [Polivanova et al. 2020]. However, the format of ECA — relative duration, regularity, schedules, obligations to assume, and often the reproduction of methods and roles typical of school education — also sets limits to meeting parents' demand. It could be for this reason that the KidZania concept has been increasingly popular among parents and their children.

Furthermore, the distinguishing feature of KidZania's target audience is the focus on children's engagement in educational practices and control over the productivity of time use combined with concerns about sensory overload [Kosaretsky, Kudryavtseva, Fiofanova 2018]. This is where the interest for formats that are not purely entertaining comes from. Such parents prefer "productive entertainment" over "pure entertainment" and "an extra portion" of learning.

Therefore, it is not KidZania's formal status but parents' subjective attitudes, goals, and objectives that determine KidZania's place in the learning environment. KidZania is not part of every urban family's learning environment, which depends on sociocultural factors (family education and cultural capital) and financial situation. There are

times when KidZania is part of a child's subjective learning environment, while remaining objectively inaccessible.

There are reasons for talking about KidZania as a unique element of the learning environment, yet whether KidZania is unique *per se* and has a good edutainment potential is arguable. Other formats of edutainment centers can probably boast more or less the same opportunities. Comparative assessment of different edutainment models and formats to identify their common features and differences and find correlations with the learning and development objectives and families' demand is a promising area of research on modern learning ecosystems.

As part of this research, it would be reasonable to pay attention to the tension between the entertainment and education orientations of edutainment centers, i. e. between the business goals and financially-centered development strategies on the one hand and the long-term vision prioritizing customer engagement over returns on investment on the other hand. It could be assumed that this tension results from the need to get higher and faster returns while at the same time achieving a level of service quality that will improve customer engagement and guarantee returning visitors. Creation and maintenance of such centers is impossible today without heavy investments. This is why the model of KidZania as well as other edutainment centers implies not only chargeable services but also affiliation with the world's leading brands. This position makes KidZania vulnerable to criticism. In particular, KidZania is blamed for limiting the range of jobs that children can role-play, thereby shaping a distorted idea of the labor market. For instance, a researcher from the United Arab Emirates laments that experience of role-playing a McDonald's cashier is irrelevant for Arab children because local population doesn't work in McDonald's [Baker 2014]. An even more essential drawback of KidZania is that it offers no opportunity to learn about careers of the future, which is growing more and more important nowadays.

This way, KidZania faces the need to cooperate with schools, universities, and various communities. Such cooperation could also be of interest to regional education systems on the lookout for additional resources, first of all learning environment infrastructure and equipment. There have been precedents of collaboration networks, but they are all local.

Another line of tension concerns the balance of real and virtual edutainment formats. Promising areas of research include analysis of the immersion, engagement, and cooperation effects and the specific aspects of emotional experience generation and manifestation in KidZania as compared to virtual reality environments. It was only yesterday that optimism about VR edutainment was high, but the distance learning experience induced by the COVID-19 pandemic has made personal interactions and "live play" the greatest value of all.

We are grateful to KidZania Moscow and KidZania's headquarters in Mexico for their support.

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Teaching History to Petersburg Gymnasium Students in the First Half of the 19th Century

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Received in February 2021

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Abstract

This article explores the practices of teaching history in men's gymnasiums of the first half of the 19th century in Saint Petersburg, analyzing the curricula, the content of textbooks and examinations as well as theoretical developments and methodological techniques in the design of textbooks on world and Russian history. At the infancy stage of gymnasium education development, the focus was on teaching world history. Meanwhile, even schools in Saint Petersburg had great difficulty in selecting the textbooks. Handbooks written by foreign authors and, later, Saint Petersburg teachers, represented bulky volumes with no illustrative material or instructional guidelines.

Keywords

history of education, school textbook, teaching history, gymnasium.

For citing

Pashkova T. I. (2021) Kak prepodavali istoriyu peterburgskim gimnazistam v pervoy polovine XIX v. [Teaching History to Petersburg Gymnasium Students in the First Half of the 19th Century]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 2, pp. 261–278. https://doi.org/10.17323/1814–9545–2021–2–261–278

Pre-revolutionary secondary school practices of teaching history have repeatedly attracted the attention of researchers [Orlovsky 2002; Shaparina 2004; Volodina 2004; Topchieva 2004; Ponikarova 2005; Fedorova 2012; Volobuev 2014; Studenikin 2016; Fuks 2017], who mostly focus on the content of school textbooks at the dawn of historical science in the 19th–early 20th century and on the methods of teaching history in the broadest strokes. Meanwhile, in most cases the authors look at the subject of their research through the eyes of the Ministry of National Education, i. e. through the prism of its prescriptions and policies. However, it also appears important and necessary to analyze the actual situation with school history education at "grass-roots" level, so this article will mostly zero in on the practices of teaching history in Saint Petersburg men's gymnasiums of the first half of the 19th century. The goal of this study is therefore to describe and analyze histo-

Translated from Russian by I. Zhuchkova.

ry course curricula and the content of textbooks and examinations as well as theoretical developments and methodological techniques in the design of textbooks on world and Russian history.

Early History Curricula and Instructional Guidelines Developed by Sergey Uvarov

History as a course was introduced in gymnasium curricula by the very first Charter of Educational Institutions adopted on November 5, 1804.[1] Initially, history and geography were taught by the same teacher, so the two subjects were coupled in the teaching hours distribution.

Surviving documents from Saint Petersburg Governorate Gymnasium, the only institution of this type in Saint Petersburg at that time, indicate that the focus was placed on teaching world history during this early period. The 1808 public examination time table for the first generation of gymnasium graduates read, in particular, "history of the Roman Empire, the Russian Empire until the House of Romanov, the Prussian Empire, and the English Empire until the House of Tudor".[2] Furthermore, all the textbooks approved at that time by the Main Board of Schools (the predecessor of the Ministry of National Education) were also dedicated to world history. Russian educationalist Andrey Voronov reported in his famous work on the history of Saint Petersburg educational district, using slightly inaccurate imprint, that *World History Synchronistic Charts* written by a teacher of Kazan Gymnasium known by his last name Wilfing and *An Abridgement of Universal History* by J. J. Roemer were published in 1804 and 1807, respectively.[3] The latter was a nearly 500-page oeuvre devoted to ancient, medieval and modern history and providing no information on the history of Russia. In 1815, judging by the content of examinations, the focus was still on universal history. Gymnasium students of 5th to 7th grades were expected to be able to tell about "history as a discipline, its areas of study and periods, an-

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[1] His Imperial Majesty's Chancellery (1830) Vysochayshe utverzhdenny ustav uchebnykh zavedeniy, podvedomykh universitetam [The Imperially Approved Charter of Educational Institutions Affiliated with Universities]. *Polnoe sobranie zakonov Rossiyskoy imperii. Pervoe sobranie. T. XXVIII* [The Complete Collection of Laws of the Russian Empire. Collection One. Vol. XXVIII], St Petersburg: His Imperial Majesty's Chancellery, no 25.501 (hereinafter referred to as "the 1804 Charter").

[2] *Uchebnye predmety, v koikh imeyut byt' ispytyvaemy v prisutstvii znamenitogo sobraniya vospitanniki S.-Peterburgskoy gubernskoy gimnazii 25 i 26 iyunya 1808 g.* [Subjects in Which Students of Saint Petersburg Governorate Gymnasium Should Take Examinations on the 25th and 26th of June 1808 in the Presence of the Famous Assembly], s. a.

[3] Voronov A. (1849) *Istoriko-statisticheskoe obozrenie uchebnykh zavedeniy S.-Peterburgskogo uchebnogo okruga s 1715 po 1828 god vklyuchitel'no* [A Historico-Statistical Overview of Educational Institutions of Saint Petersburg educational district from 1715 through 1828], St. Petersburg, pp. 190, 191. The second publication probably referred to Roemer J. J. (1808) *Vseobshchaya istoriya, izdannaya ot Glavnogo pravleniya uchilishch dlya gimnaziy* [Universal History Published by the Main Board of Schools for Use in Gymnasiums], St. Petersburg.

Table 1. **Hours allocated for history classes, as stipulated in the 1804 Charter (§ 22).**

Grade	Course	Hours
1	Ancient History, Geography, Mythology, and Antiquities	6
2	Modern History and Geography, Including History and Geography of Russia	6

Table 2. **The distribution of history teaching hours by grades after Sergey Uvarov's reform (1811).**[4]

Grade	Course	Hours
4	World History	2
	History of the Russian State	2
5	History of Russia	4
	Universal History	4
	Contemporary History	4
6	World History	2
	History of Russia	2
7	Contemporary History and Statistics	4
	Antiquities	2
	Mythology	2

cient history: the major great powers; medieval history: the Roman Empire, the might of the Franks and Arabs, the Crusades, and the Mongol Invasion; modern history: the discovery of the Americas, the Reformation and the effects of such, and the coups d'état of the past decades; Russian history: the key events in every period".[5]

As young count Sergey Uvarov took over Saint Petersburg educational district, he made a number of substantial changes to the men's gymnasium curriculum, although none of them concerned the *content* of history courses (for more on this, see [Pashkova 2010:25–27]). Table 2 shows the distribution of history class hours by grades after the reform.

[4] Kurganovich A. (1880) *Istoricheskaya zapiska 75-letiya Sankt-Peterburgskoy vtoroy gimnazii* [A Historical Note on the 75th Anniversary of the Second Saint Petersburg Gymnasium], St. Petersburg, Part 1, pp. 39–40.

[5] *Programma publichnogo ekzamena uchashchimsya v S.-Peterburgskoy gubernskoy gimnazii dekabrya 30, 21, 2 i 23 chisel 1815 g.* [Questions for Public Examinations to be Taken by Saint Petersburg Governorate Gymnasium Students on the 30th, 21st, 2nd, and 23rd of December 1815], s. a.

At the level of class schedules and hours, the discipline was officially divided into history of Russia and world history, yet more teaching hours were still allocated for the latter.

As the district curator, Uvarov attached great importance to teaching history, at school in particular, as a national mission. In 1813, he published a dedicated work in which he claimed that every citizen needed "a clear understanding of the most important historical events".[6] The Count considered it necessary to "unfold a huge landscape of historical sciences", "events and historical deeds" at the level of gymnasium education. The school course did not imply delving into the "philosophical truths" distilled from this "chaos", but students nevertheless had to be offered an insight into the truth and connections among historical events.[7] The curator's work contained some important instructional guidelines. First, Uvarov was convinced that the study of historical sciences should be preceded by an in-depth study of geography and chronology, which he called "the eyes of history". Second, he recommended introducing gymnasium students to source studies using the example of ancient history (since reading original sources "elevates the spirit" and "develops a taste"), thereby "strengthening" their knowledge of ancient languages, which is "the foundation of education as such". Third, the author considered it a good idea to "outline an overview, or a live picture, of customs, morals, and literacy" for every historical period when completing the study of such. Fourth, history of Russia should be delivered as part of modern history and studied "synchronistically with history of other European states". Sergey Uvarov believed that history should be studied not only in classes but also at home, "according to a plan outlined by the teacher". As for practical teaching recommendations, he insisted on abandoning the "pernicious method based solely on learners' memory" and thought it useful to require "written reports on lectures" from students.[8]

Early Translated History Textbooks

The zestful curator probably encouraged his subordinates to write decent "historical compendiums or handbooks", which were extremely scarce at the time.[9] Anyway, in 1811, teacher of Saint Petersburg Governorate Gymnasium Yegor Konstantinov, claiming to be "of as much use to the fatherland as possible, particularly in teaching the youth", published his translation of *An Abridgement of Universal History*, originally written in German by Johann Georg August Galletti, professor of Gotha Gymnasium, and published for the first time in Gotha in 1810. Konstantinov extended his translation with a short summary of

[6] Uvarov S. (1813) *O prepodavanii istorii otnositel'no k narodnomu vospitaniyu* [On Teaching History as Part of National Education], St. Petersburg, p. 2.
[7] Ibid, pp. 9, 13.
[8] Ibid, pp. 9–12, 5.
[9] Ibid, p. 5.

Russian history based on the same professor's approach[10]. It follows from the correspondence between Konstantinov and Uvarov that this book was approved by the latter and even "received imperial support" through his mediation.[11] As a result, Konstantinov was awarded a diamond ring for his translation and publishing efforts.[12]

The textbook by Galletti stood out from similar books in that it boasted an introduction in which the author speculated on the subject of history, its sources (oral and written), and the "aids" to study it, by which he understood geography, chronology, numismatics, genealogy, heraldry, and diplomacy.[13] According to the professor, universal history only dealt with "such events that have an impact on the human race or at least the greatest part of it".[14] The proportion of events from Russian history was comparatively low. From the ancient period, for instance, Galletti only mentioned the distribution of lands by Vladimir the Great among his sons, which made it easier for Batu Khan to invade Kievan Rus.[15] All the other important events that had an impact on the "human race" fell within the 18th and early 19th centuries: the reign of the "glorious" Peter the Great, followed by his niece Anna Ioannovna who enjoyed the fruit of her labor in "happy wars" with the Turks and Swedes, the Seven Years' War and Peter III's alliance with Frederick the Great, participation of Russia in the Partitions of Poland, Russo-Turkish wars, Russia's expansion into Asia, and the war against Napoleon.[16]

Konstantinov elaborated the German professor's oeuvre, adding a text of his own. His *Overview of Russian History*, 324 pages long, represented a rather detailed outline of events up to the death of Catherine the Great. Records indicate that, once published, Konstantinov's translation began to be used in Saint Petersburg Gymnasium as a study guide.[17] Eight years later, having made sure that his work had "received a cordial reception in Russian public and private educational institutions when teaching youth", Konstantinov started working on the second edition, which he "revised and extended up to <...> 1819". Probably hoping for further patronage, the teacher wisely dedicated his book to Sergey Uvarov as "an admirer and honorable patron of sciences" and asked him to offer it for consideration by the Academic Committee.[18]

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[10] Galletti J.G.A. (1811) *Sokrashchenie vseobshchey istorii* [An Abridgement of Universal History], St. Petersburg.
[11] Central State Historical Archive of St. Petersburg, Fund no 139. Inv. 1, doc. no 2172, p. 41(rev).
[12] Russian State Historical Archive, Fund no 733. Inv. 20, doc. no 297, pp. 5(rev)–7.
[13] Galletti J.G.A. (1819) *Sokrashchenie vseobshchey istorii* [An Abridgement of Universal History], St. Petersburg, pp. 1–3.
[14] Ibid, p. 4.
[15] Ibid, p. 143.
[16] Ibid, pp. 143, 214–217, 224, 225, 231, 242, 247.
[17] Central State Historical Archive of St. Petersburg, Fund no 139. Inv. 1, doc. no 2172, p. 3.
[18] Ibid, p. 1–1(rev).

The book was published in 1819, having become 20 pages longer due to the summary of milestones of the reigns of Paul I and Alexander I.[19] This time, the author ended his timeline of Russian history just before the Congress of Aix-la-Chapelle, i. e. he basically extended the storyline up to the current events — which was extremely untypical of textbooks of the first half of the 19th century [Pashkova 2020].

Another textbook, *Memorable Events in World History* by G. G. Bredov, was translated from German in 1814 by Mikhail Zubakovich, another history teacher of Saint Petersburg Governorate Gymnasium.[20] The book was recognized as "useful for gymnasiums and uyezd schools" by the Minister of Education Alexey Razumovsky, who ordered procurement of 50 copies upon discussing the educational district's needs in his correspondence with Sergey Uvarov in November 1814.[21] In May 1820, the Ministry of National Education made an inquiry to the district chancellery, asking whether Zubakovich's translation was used in teaching. It followed from the answer that the textbook was used as a guideline in Saint Petersburg Governorate Gymnasium, while academic reports from other gymnasiums in the district provided "no evidence of this book being used as a textbook, yet apparently it is used as a guideline".[22]

There are mentions in research literature that educational institutions of the early 19th century used a few more translated textbooks[23] as well as books by Johann Gotthilf Stritter, Pavel Stroyev,[24] and other authors. For instance, Tatiana Volodina writes in her thesis paper that the Main Board of Schools purchased Pavel Stroyev's book, published in 1814 and republished in 1819, and Mikhail Muravyov's work to be distributed among the educational districts.[25] According to Volodina [Vo-

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[19] Galletti J.G.A. (1819) *Sokrashchenie vseobshchey istorii* [An Abridgement of Universal History], St. Petersburg.

[20] Bredov G.G. (1814) *Dostopamyatnye proisshestviya vo vsemirnoy istorii, opisannye G. G. Bredovym. Dlya nachal'nogo ucheniya istorii; osobenno zhe v uyezdnykh i prikhodskikh uchilishchakh* [Memorable Events in World History Described by G. G. Bredov. For early studies of history, particularly in uyezd and parochial schools], St. Petersburg.

[21] Central State Historical Archive of St. Petersburg, Fund no 139. Inv. 1, doc. no 1255, pp. 1–2.

[22] Central State Historical Archive of St. Petersburg, Fund no 139. Inv. 1, doc. no 2435, pp. 1–2.

[23] Vegelin Z. (1807) *Nachertanie rossiyskoy istorii dlya upotrebleniya yunoshestva i osobenno sey imperii* [An Outline of Russian History to Be Taught to Youth, Particularly in the Russian Empire], Moscow; Kirnak T. (1804) *Kratkaya istoriya rossiyskaya* [A Brief History of Russia], St. Petersburg.

[24] Stritter J.G. (1800–1802) *Istoriya Rossiyskogo gosudarstva* [History of the Russian State], St. Petersburg; Stroyev P. (1814) *Kratkaya rossiyskaya istoriya dlya yunoshestva* [A Brief History of Russia for Youth], St. Petersburg.

[25] Stroyev P. (1814) *Kratkaya rossiyskaya istoriya dlya nachinayushchikh* [A Brief History of Russia for Beginners], Moscow; Muravyov M. (1810) *Opyty istorii, slovesnosti i nravoucheniya* [Historical, Philological, and Moral Teaching Practices], Moscow, Parts 1–2.

lodina 2004:116, 468], Sergey Uvarov took great pains, as curator, to distribute Muravyov's book across the educational institutions under his jurisdiction. However, there is no evidence of using it in Saint Petersburg Governorate Gymnasium.

Historian Alexander Fuks identifies *An Abridgement of N. Karamzin's 'History of the Russian State' for Youth* by August Wilhelm Tappe published in 1819 as the first official handbook of Russian history [Fuks 2017:55–56]. At the initiative of Sergey Uvarov, several copies of Karamzin's books were distributed among libraries of Saint Petersburg educational district gymnasiums in February 1818, including the library of Saint Petersburg Governorate Gymnasium which received three copies.[26] The number of copies itself indicates that those books could only be used for supplementary reading outside of class.

It could therefore be concluded that Yegor Konstantinov's work, even though it was part of a book on universal history, became the first textbook on the history of Russia used for teaching to gymnasium students in Saint Petersburg.

As for the textbook by G. G. Bredov translated by Zubakovich, only one out of 61 chapters about "memorable events" in universal history was devoted to Russian affairs: *Russia. Peter the Great*.[27] Four pages gave a brief description of the country's territory and peoples inhabiting it, the morals and religious beliefs of ancient Slavs, the summoning of the Varangians, the Christianization, Turco-Mongol rule, and the gathering of the Russian lands, and five more pages described the reign of Peter the Great. As the translator admits in the introduction, this chapter and several others were somewhat modified during translation so that students would "become more affirmed in their love for God, the Sovereign, and the fatherland".

Early Study Guides by Russian Authors

According to Andrey Voronov[28], Saint Petersburg educational district started with using *A Course in Universal History* by professor of the Pedagogical Institute Yevdokim Zyablovskiy, published in 1811–1812 and originally designed for civil officials and certainly not for school students, and then switched to *A Guide to Learning Universal Political History* by Ivan Kaydanov, professor of Tsarskoye Selo Lyceum.[29]

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[26] Central State Historical Archive of St. Petersburg, Fund no 139. Inv. 1, doc. no 1926, pp. 1–2.

[27] Bredov G.G. (1814) *Dostopamyatnye proisshestviya vo vsemirnoy istorii, opisannye G. G. Bredovym. Dlya nachal'nogo ucheniya istorii; osobenno zhe v uyezdnykh i prikhodskikh uchilishchakh* [Memorable Events in World History Described by G. G. Bredov. For early studies of history, particularly in uyezd and parochial schools], St. Petersburg, pp. 149–157.

[28] Voronov A. (1849) *Istoriko-statisticheskoe obozrenie uchebnykh zavedeniy S.-Peterburgskogo uchebnogo okruga s 1715 po 1828 god vklyuchitel'no* [A Historico-Statistical Overview of Educational Institutions of Saint Petersburg educational district from 1715 through 1828], St. Petersburg, pp. 183,193, 194.

Zyablovskiy's textbook features a traditional division of universal history into periods. However, in each of the periods the author pays particular attention to the form of government, religious beliefs, and progress in education and trade.[30] He also begins his study guide with an extensive introduction on a few dozens of pages, in which he explains what history is, why studying it requires good memory and reason, what good it can do, etc. In keeping with the beliefs of his times, Zyablovskiy argued that history was "a description of memorable events that occurred among people", i.e. events that "made a special change in civil societies, which show extraordinary examples of virtues and vices, knowledge and mistakes".[31] The author considered teaching chronologically from ancient times to recent events to be the best possible method and polemicized with those who believed it a better idea to deliver the material "backwards" in the interests of school students, so as "not to burden children's memory with barbaric times and events".[32] According to Zyablovskiy, the good of history consisted not only in memory training but also in that it represented "a collection of moral experiences of the human race".[33] Expounding on possible teaching methods, the author argued that the ethnographic, or narrative method was the best for teaching national ("specific") history, while the synchronistic, or blended (ethnographic-synchronistic) method should be used to teach universal history. At the same time, in his opinion, only the former as the simplest and the most accessible one was suitable for teaching history to beginners, school students in particular.[34] Zyablovskiy's list of "aids" in studying history that lent credibility to it was even longer than the one proposed by Galletti. In addition to the disciplines specified above, Zyablovskiy's list also included statistics, ethnography ("knowledge of inscriptions"), archaeology ("knowledge of antiquities"), and mythology.[35]

Addressing lyceum students in his study guide, Ivan Kaydanov formulated the following principles of material selection: "brevity, clarity, and the choice of subjects, knowledge of which is useful and necessary for you".[36] At the same time, the professor emphasized the importance of cause-and-effect relationships between "important events" and the country's internal situation as well as the need to assess events from moral and political perspectives. For Kaydanov, history was a "practical school of wisdom and virtue" that teaches "to see divine providence in all

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[30] Zyablovskiy Y. (1811) *Kurs vseobshchey istorii* [A Course in Universal History], St. Petersburg, p. III.

[31] Ibid, p. 2.

[32] Ibid, p. 20.

[33] Ibid, p. 21.

[34] Ibid, pp. 21–22.

[35] Ibid, pp. 27–30.

[36] Kaydanov I. (1817) *Rukovodstvo k poznaniyu vseobshchey politicheskoy istorii. Ch. 1. Drevnyaya istoriya* [A Guide to Learning Universal Political History. Part 1: Ancient History], St. Petersburg, p. III.

the events on earth and humbly submit to it; to walk steadily along the path of virtue; to value the good of one's fatherland above everything else in the world; and to comply with the supreme will of the august <...> Sovereign with dignity and zeal".[37] In the introduction to his study guide, he gives a number of methodological recommendations for students as well as teachers. For example, he believed that teaching history should be first of all combined with geography studies, so students had to have access to maps both in class and at home.[38] The book contained a chronological table and an alphabetical list of the key events, names and toponyms. However, the professor argued that, since history is "about memory and reason", mechanical memorization of dates and names is not enough. Learning history is to "plunge into the spirit of the age and the patterns of thinking prevalent at that time".[39]

In April 1822, educational authorities suddenly decided that the books by Galletti and Bredov, "due to their spirit of narration and complete disagreement with the Holy Scriptures, cannot be accepted as textbooks for study".[40] It was ordered to immediately withdraw the books from teaching and collect all the copies from students because the books did "more harm than good". Kaydanov's study guide became the only book approved by the Main Board of Schools for teaching world history. The curator was sent 30 copies of Bredov's book collected from students, and "proficient and well-intended" history teachers were strongly advised to "stick to the disposition and spirit of famous historical writings" by Bossuet, Rolland, and Ferrand.[41]

Such an abrupt shift in reference points has to do with Saint Petersburg educational district being taken over by Dmitry Runich, who started persecuting a number of professors at Saint Petersburg University. Konstantin Fisher, one of the then students of Saint Petersburg Governorate Gymnasium and a would-be Senator, wrote in his memoirs that Runich, when attending an examination, was deeply dissatisfied with Fisher's reasoning about the nature of power that he had learned from Galletti's textbook. The curator was indignant at gymnasium students being taught "nonsense". Summing up this story, Fisher wrote regretfully that his reference to the textbook inflicted damage to teacher Yegor Konstantinov, who allegedly received several hundred copies in compensation for his translation of Galletti, which turned to "waste paper" after the book was banned.[42] Konstantinov was fired in

[37] Ibid.
[38] Ibid, pp. V, VII.
[39] Ibid, pp. VI–VII.
[40] Central State Historical Archive of St. Petersburg, Fund no 139. Inv. 1, doc. no 3083, p. 3(rev).
[41] Central State Historical Archive of St. Petersburg, Fund no 139. Inv. 1, doc. no 3083, pp. 4–4(rev), 6.
[42] Quoted after: Kurganovich A. (1880) *Istoricheskaya zapiska 75-letiya Sankt-Peterburgskoy vtoroy gimnazii* [A Historical Note on the 75th Anniversary of the Second Saint Petersburg Gymnasium], St. Petersburg, Part 1, pp. 52–54.

November 1822 and deprived of his teacher license "at his own request" in October 1823.[43] After the incident with the textbooks by Galletti and Bredov, according to Voronov, another translated book was approved for use in educational institutions of Saint Petersburg educational district for some time: the textbook by Johann Matthias Schröckh, translated by Karl Heinrich Ludwig.[44]

As can be seen, even schools in Saint Petersburg educational district had a tough time with textbooks at the infancy stage of gymnasium education development. Most often, history teachers used extra-long translated works (Roemer's book is nearly 500 pages long, and the book by Galletti contains about 300 pages). At the same time, the first study guides by Russian authors — Yegor Konstantinov, Yevdokim Zyablovskiy and Ivan Kaydanov — began to emerge. However, such textbooks were clearly not enough. In 1817, Kaydanov lamented that "many wonderful books for children and youth have been published abroad, while sadly very few such works exist in our country".[45] For this reason, local teachers, especially in small towns and villages with poor access to textbooks, often used their own notes or just any textbook available [Pashkova et al. 2019:260]. There is a perception in research literature that school came to be under strict governmental control as early as at the outset of the 19th century [Fedorova 2012:76, 78]. Our study of this issue leads to the conclusion that the Ministry of National Education was not concerned with standardizing school curricula and teaching methods until the late 1820s, as it had no financial muscle to implement this idea or the necessary infrastructure to supervise the implementation effectively [Pashkova et al. 2019:258–259].

New History Teaching Instructions and Textbooks

It was not until December 11, 1824, when Alexander Shishkov was assigned the Minister of National Education, that it was proposed to select strictly defined textbooks for use in all educational institutions[46] (for more on this, see [Pashkova et al. 2019:259]). For various reasons,

[43] Russian State Historical Archive, Fund no 733. Inv. 20, doc. no 297, pp. 10–10(rev), 27.

[44] Voronov A. (1854) *Istoriko-statisticheskoe obozrenie uchebnykh zavedeniy S.-Peterburgskogo uchebnogo okruga s 1829 po 1853 god vklyuchitel'no* [A Historico-Statistical Overview of Educational Institutions of Saint Petersburg educational district from 1829 through 1853], St. Petersburg, pp. 329–330; *Drevnyaya i novaya vseobshchaya istoriya, sochinennaya I. M. Shrekom dlya obucheniya yunoshestva* [Ancient and Modern Universal History Composed by J. M. Schröckh for Teaching to Youth], St. Petersburg, 1824.

[45] Kaydanov I. (1817) *Rukovodstvo k poznaniyu vseobshchey politicheskoy istorii. Ch. 1. Drevnyaya istoriya* [A Guide to Learning Universal Political History. Part 1: Ancient History], St. Petersburg, p. II.

[46] Russian State Historical Archive, Fund no 733. Inv. 87, doc. no 245, p. 1(rev); *Sbornik rasporyazheniy po Ministerstvu narodnogo prosveshcheniya* [Collection of Orders of the Ministry of National Education], St. Petersburg, 1866, Vol. 1. 1802–1834, no 254.

Table 3. **Distribution of gymnasium history course content by grades in compliance with the Outline adopted in 1830.**[47]

Grade	Content
3	Introduction and History of Ancient Peoples up to the Romans
4	History of the Roman Empire and European States
5	History of France, Germany, the Netherlands, Great Britain, Denmark, Norway, Sweden, Prussia, Poland, Hungary, and Other Remarkable States in Other Parts of the World
6	History of Russia
7	Review of course material and compilation of synchronistic tables

Table 4. **Distribution of gymnasium history course content by grades approved by the Committee for Organization of Educational Institutions.**[48]

Grade	Content
3	Overview of Universal History
4	Ancient History
5	Medieval History
6	Modern History
7	History of Russia

however, the declared idea turned out to be very difficult to actualize. The Ministry had to readdress this problem a decade later, as teachers kept using books of their own "volition" instead of the approved ones.[49]

[47] Ibid, p. 23.

[48] Voronov A. (1854) *Istoriko-statisticheskoe obozrenie uchebnykh zavedeniy S.-Peterburgskogo uchebnogo okruga s 1829 po 1853 god vklyuchitel'no* [A Historico-Statistical Overview of Educational Institutions of Saint Petersburg educational district from 1829 through 1853], St. Petersburg, App. 17, p. 111; Kurganovich A., Krugly A. (1894) *Istoricheskaya zapiska 75-letiya Sankt-Peterburgskoy vtoroy gimnazii* [A Historical Note on the 75th Anniversary of the Second Saint Petersburg Gymnasium], St. Petersburg, Part 2, p. 29; Anichkov N. (1873) *Istoricheskaya zapiska pyatidesyatiletiya Tretyey Sankt-Peterburgskoy gimnazii* [A Historical Note on the 50th Anniversary of the Third Saint Petersburg Gymnasium], St. Petersburg, p. 96.

[49] *Sbornik postanovleniy po Ministerstvu narodnogo prosveshcheniya. 2-e izd.* [Collection of Resolutions of the Ministry of National Education. 2nd Edition], St. Pe-

A new Charter of Gymnasiums and Schools was imperially approved on December 8, 1828,[50] prescribing to teach history in grades 3 through 7.[51] On July 16, 1830, the Council of Saint Petersburg University adopted the *Outline of Courses in Gymnasiums and Schools in Compliance to the New Charter*,[52] which specifically stipulated a proper manner of teaching: consistency and accuracy of narration; history should not be confined to memory exercise; etc.[53] This document was the first to provide a detailed distribution of course content by grades (Table 3).

However, new instructions followed in two years, changing the curriculum again (Table 4).

According to the newly introduced rules, teaching of Russian history was transferred to senior grades. However, it becomes clear from the documents of Saint Petersburg gymnasiums — there were already a few at that time — that in practice, some information on Russian history began to be given to boys as early as in the 3rd grade in the late 1830s. Gymnasium administrators motivated this decision by the fact that "students who leave gymnasiums in early grades without completing the course will at least have knowledge of Russian history", otherwise it would remain a blank spot to them.[54]

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tersburg, 1875, Vol. 2. Section 1. 1825–1839, no 15; *Zhurnal Ministerstva narodnogo prosveshcheniya* [Journal of the Ministry of National Education], 1836. Part IX. January–March, pp. XVI–XVII.

50 His Imperial Majesty's Chancellery (1830) Vysochayshe utverzhdenny 8 dekabrya 1828 g. Ustav gimnaziy i uchilishch, uyezdnykh i prikhodskikh, sostoyashchikh v vedomstve universitetov: S.-Peterburgskogo, Moskovskogo, Kazanskogo i Khar'kovskogo [Charter of Gymnasiums and Schools, Uyezd and Parochial, Affiliated with Saint Petersburg, Moscow, Kazan and Kharkov Universities, Imperially Approved on December 8, 1828]. *Polnoe sobranie zakonov Rossiyskoy imperii. Sobranie vtoroe. T. 3* [The Complete Collection of Laws of the Russian Empire. Collection Two. Vol. 3], St. Petersburg: His Imperial Majesty Chancellery, no 2502.

51 Solovyev D. (1880) *Pyatidesyatiletie S.-Peterburgskoy Pervoy gimnazii. 1830–1880. Istoricheskaya zapiska* [The 50th Anniversary of the First Saint Petersburg Gymnasium. 1830–1880. A Historical Note], St. Petersburg, p. 107; M. Stasyulevich Publishing House (1886) *Pyatidesyatiletie S.-Peterburgskoy Larinskoy gimnazii. 1836–1886. Istoricheskiy ocherk* [The 50th Anniversary of Saint Petersburg Larin Gymnasium. 1836–1886. A Historical Sketch], St. Petersburg: M. Stasyulevich Publishing House, p. 3.

52 Kurganovich A., Krugly A. (1894) *Istoricheskaya zapiska 75-letiya Sankt-Peterburgskoy vtoroy gimnazii* [A Historical Note on the 75th Anniversary of the Second Saint Petersburg Gymnasium], St. Petersburg, Part 2, p. 16.

53 Ibid, p. 22.

54 Anichkov N. (1873) *Istoricheskaya zapiska pyatidesyatiletiya Tretyey Sankt-Peterburgskoy gimnazii* [A Historical Note on the 50th Anniversary of the Third Saint Petersburg Gymnasium], St. Petersburg, p. 142; Solovyev D. (1880) *Pyatidesyatiletie S.-Peterburgskoy Pervoy gimnazii. 1830–1880. Istoricheskaya zapiska* [The 50th Anniversary of the First Saint Petersburg Gymnasium. 1830–1880. A Historical Note], St. Petersburg, p. 181; *Pyatidesyatiletie S.-Peterburgskoy Larinskoy gimnazii. 1836–1886. Istoricheskiy ocherk* [The 50th Anniversary of Saint Petersburg Larin Gymnasium. 1836–1886. A Historical Sketch], St. Petersburg, 1886,

The situation with textbooks during this period was less ambivalent than at the previous stage. In 1826, a dedicated Committee for Consideration of Study Guides was established under the Committee for Organization of Educational Institutions, which instructed Ivan Kaydanov to compile textbooks on universal and Russian history "in the light of the lack of decent history study guides". In 1828, Kaydanov presented his *Outline of History of the Russian State*, which was approved for use in gymnasiums on February 3, 1830, according to Voronov.[55] *A Brief Outline of World History* written by professor Kaydanov in 1822 was revised by the author in 1827 and later republished a number of times under the title *A Brief Outline of Universal History*.[56] The use of these study guides in Saint Petersburg schools is confirmed by the fact that they are mentioned in the list of textbooks used by the Second and Third Saint Petersburg Gymnasiums.[57]

In his *Outline of History of the Russian State*, Kaydanov described the events up until the reign of Alexander I and gave two genealogical tables, of Rurikids and the House of Romanov. Every historical period that he identified traditionally taking cue from Karamzin was followed by a conclusive summary entitled *Internal Situation of the Russian State* (in modern ages, summaries were provided for each reign). Those summaries gave a brief description of the country's territory, form and structure of government, civil ranks, taxes and duties, legislation and justice, religious affairs, maritime infrastructure and trade, finances, lifestyle, military art, education attainment, sciences and arts, morals and beliefs, etc.[58]

In 1836, the Committee for Consideration of Study Guides was

p. 14; Central State Historical Archive of St. Petersburg, Fund no 139. Inv. 1, doc. no 4474, pp. 7–7(rev), 9, 20(rev); doc. no 4552, p. 1; Russian State Historical Archive, Fund no 733. Inv. 87, doc. no 359, pp. 4–6.

55 Russian State Historical Archive, Fund no 738. Inv. 1, doc. no 1, p. 482; doc. no 2, p. 109, 114(rev), 189, 205–206, 282, 283, 296; Voronov A. (1854) *Istoriko-statisticheskoe obozrenie uchebnykh zavedeniy S.-Peterburgskogo uchebnogo okruga s 1829 po 1853 god vklyuchitel'no* [A Historico-Statistical Overview of Educational Institutions of Saint Petersburg educational district from 1829 through 1853], St. Petersburg, p. 329.

56 Kaydanov I. (1822) *Kratkoe nachertanie vsemirnoy istorii* [A Brief Outline of World History], St. Petersburg; Kaydanov I. (1827) *Kratkoe nachertanie vseobshchey istorii* [A Brief Outline of Universal History], St. Petersburg.

57 Kurganovich A., Krugly A. (1894) *Istoricheskaya zapiska 75-letiya Sankt-Peterburgskoy vtoroy gimnazii* [A Historical Note on the 75th Anniversary of the Second Saint Petersburg Gymnasium], St. Petersburg, Part 2, p. 26; Postels A. (1839) *Rukovodstvo dlya roditeley, zhelayushchikh opredelit' detey svoikh vo 2-uyu S.-Peterburgskuyu gimnaziyu* [Guidelines for Parents Willing to Enroll Their Children in the Second Saint Petersburg Gymnasium], St. Petersburg, p. 41; Anichkov N. (1873) *Istoricheskaya zapiska pyatidesyatiletiya Tretyey Sankt-Peterburgskoy gimnazii* [A Historical Note on the 50th Anniversary of the Third Saint Petersburg Gymnasium], St. Petersburg, p. 17.

58 Kaydanov I. (1829) *Nachertanie istorii gosudarstva Rossiyskogo* [Outline of History of the Russian State], St. Petersburg, pp. 25–32.

dissolved. The Ministry entrusted the approval of new textbooks to the Academy of Sciences or university councils.[59] It is difficult to say whether this was a coincidence or not, but *Outline of Russia's History* by Nikolay Ustryalov was approved to replace Kaydanov's textbook as soon as on January 13, 1837.[60] The story of Ustryalov's victory in the competition was studied in detail by Tatiana Volodina [2004:215–218]. At his request, Sergey Uvarov "had the pleasure of humbly presenting" a copy of the book to the Emperor in December 1836, and to the Tsesarevich in January 1837. Both graced the book with their attention: the Emperor accorded his imperial approval, and the Tsesarevich expressed his gratitude to the author.[61]

In 1830, Yegor Konstantinov published a two-volume textbook on Russia's history. The author made no bones about the book being a compilation "made up of the latest Russian works".[62] The original *Overview of Russian History* published in 1811 was extended (the first part to 267 pages, and the second one, to 410) and somewhat improved. Narration extends until the accession of Nicholas I, and each of the five periods has an appended "chronological table" with columns entitled "Political situation of the Russian state" and "Religion, sciences, and arts". Unfortunately, the documents do not allow tracing further history of Konstantinov's new book: there is neither direct or indirect evidence of using it by Saint Petersburg gymnasium teachers in the 1830s. In addition, although the title page says that the textbook was compiled by a senior teacher of Saint Petersburg Governorate Gymnasium, Konstantinov had not actually worked as a teacher for seven years by then — he had transferred to the Ministry of State Property in October 1823.[63] This discrepancy can probably be explained by the fact that there was a long delay between submission and publication of the manuscript.

Kaydanov's textbook on universal history was used by teachers until 1847, when it was replaced with a book by Semen Smaragdov,[64]

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[59] Voronov A. (1854) *Istoriko-statisticheskoe obozrenie uchebnykh zavedeniy S.-Peterburgskogo uchebnogo okruga s 1829 po 1853 god vklyuchitel'no* [A Historico-Statistical Overview of Educational Institutions of Saint Petersburg educational district from 1829 through 1853], St. Petersburg, p. 335.

[60] Ibid, p. 336.

[61] Central State Historical Archive of St. Petersburg, Fund no 139. Inv. 1, doc. no 4511, pp. 1, 3.

[62] Konstantinov Y. (1830) *Uchebnaya kniga istorii Gosudarstva Rossiyskogo, sostavlennaya iz noveyshikh otechestvennykh tvoreniy starshim uchitelem Sankt-Peterburgskoy gubernskoy gimnazii kollezhskim asessorom Y. Konstantinovym, s prisovokupleniem letoischislitel'nykh tablits k kazhdomu periodu. Ch. 1–2* [Textbook on the History of the Russian State, Compiled from the Most Recent Russian Books by Y. Konstantinov, Collegiate Assessor and Senior Teacher of Saint Petersburg Governorate Gymnasium, with Appended Chronological Tables for Each Period. Parts 1–2], St. Petersburg.

[63] Russian State Historical Archive, Fund no 733. Inv. 20, doc. no 297, p. 28.

[64] Voronov A. (1854) *Istoriko-statisticheskoe obozrenie uchebnykh zavedeniy S.-Peter-*

teacher of history and geography at the Orphan Institute of the Imperial Gatchina Orphan Home. Smaragdov's guide consisted of three volumes on ancient, medieval and modern history. In the preface to the first volume, the author defined history as a "harmonious and consistent" science, understanding of which requires investigating the causes and effects of various events and phenomena.[65] According to Smaragdov, the best teaching method consisted in the ability to "consider the laws of human cognitive capacity and the organization of schools", which implied learning the facts in the first place and then studying their causes and purposes in order to "extract food for thought and emotion out of them".[66] In teaching world history, Smaragdov recognized only the ethnographic method as acceptable.[67] He saw the mission of secondary school in introducing students consistently to the most important facts and sources (oral traditions, monuments, government papers, historical writings, etc.) and teaching them to "think about causes and effects", so that they would be able to "understand scientific conclusions and higher perspectives on life and the human race in universities".[68] Smaragdov did not regard his guide as dogmatic, implying that an experienced teacher would decide themselves which parts to use and which to skip.[69]

An approach proposed by Alexander Yazvinsky was adopted in Saint Petersburg gymnasiums in 1836 for teaching chronology "as the foundation of history". The approach was "based on the idea that it is easier to memorize locations and objects available to the eye than <...> sounds or numbers".[70] It was a mnemonic way of learning dates of events and names of rulers using specifically designed tables. Yazvinsky suggested using a board with a large square divided into 100 small squares. The large square symbolized the century, and the small ones denoted years. When memorizing the dates of accession of various princes, kings and emperors, students would cover the respective cells with stamps, repeating the procedure until they made no more mistakes.[71] Enthusiasm for this approach, which actually seemed inno-

burgskogo uchebnogo okruga s 1829 po 1853 god vklyuchitel'no [A Historico-Statistical Overview of Educational Institutions of Saint Petersburg educational district from 1829 through 1853], St. Petersburg, pp. 336–337.

65 Smaragdov S. (1840) *Rukovodstvo k poznaniyu drevney istorii dlya srednikh uchebnykh zavedeniy* [Guide to Learning Ancient History for Secondary Educational Institutions], St. Petersburg, p. I.

66 Ibid, p. II.

67 Ibid, p. 10.

68 Ibid, pp. III–IV, 3.

69 Ibid, p. VI.

70 Voronov A. (1854) *Istoriko-statisticheskoe obozrenie uchebnykh zavedeniy S.-Peterburgskogo uchebnogo okruga s 1829 po 1853 god vklyuchitel'no* [A Historico-Statistical Overview of Educational Institutions of Saint Petersburg educational district from 1829 through 1853], St. Petersburg, p. 150.

71 Yazvinsky A. (1837) *Metoda prepodavaniya khronologii istorii g. Yazvinskogo, izyasnennaya samim zhe izobretatelem* [Mr. A. Yazvinsky's Method of Teaching the

Table 5. **Textbooks used in Saint Petersburg gymnasiums.**

World history	History of Russia
Universal History Published by the Main Board of Schools for Use in Gymnasiums by J. J. Roemer *An Abridgement of Universal History* by Johann Georg August *Memorable Events in World History Described by G. G. Bredov. For early studies of history, particularly in uyezd and parochial schools* by G. G. Bredov *A Course in Universal History* by Yevdokim Zyablovskiy *A Guide to Learning Universal Political History* by Ivan Kaydanov *Ancient and Modern Universal History Composed by J. M. Schröckh for Teaching to Youth* by Johann Matthias Schröckh *A Brief Outline of World History* by Ivan Kaydanov *Guide to Learning Ancient History for Secondary Educational Institutions* by Semen Smaragdov	*Overview of Russian History* by Yegor Konstantinov *Outline of History of the Russian State* by Ivan Kaydanov *Outline of Russia's History* by Nikolay Ustryalov *Mr. A. Yazvinsky's Method of Teaching the Chronology of History, Explained by the Inventor Himself* by Alexander Yazvinsky

vative in the context of everyday school practices, soon turned to disappointment, and then to outright criticism. Nevertheless, Yazvinsky's approach was used in teaching for a little over a decade (for more on this, see [Pashkova 2019]).

To sum the study up, we present a summary table of textbooks that were definitely or most likely used for teaching history in Saint Petersburg gymnasiums during the first half of the 19th century (Table 5).

Overall, more attention was paid to the study of world history during the period analyzed, and it was only in the second half of the 19th century that the situation changed. The early textbooks were methodologically "void": as Nadezhda Fedorova aptly notes, only the content aspect was taken into account [Fedorova 2012:78]. Obviously enough, such books were very difficult to use due to a huge amount of information, sophisticated wording which was poorly adapted to the age characteristics of students, complete lack of illustrative examples, etc. Most teachers required students to memorize paragraphs mechanically and then reproduce them verbatim in class. However, further research is needed to understand the personal characteristics of the first history teachers of Saint Petersburg gymnasiums and their teaching methods.

Chronology of History, Explained by the Inventor Himself], St. Petersburg, pp. 3–7; Voronov A. (1854) *Istoriko-statisticheskoe obozrenie uchebnykh zavedeniy S.-Peterburgskogo uchebnogo okruga s 1829 po 1853 god vklyuchitel'no* [A Historico-Statistical Overview of Educational Institutions of Saint Petersburg educational district from 1829 through 1853], St. Petersburg, pp. 150–151.

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