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

ВОПРОСЫ ОБРАЗОВАНИЯ

Educational Studies Moscow

3 2020

National Research University Higher School of Economics

Voprosy obrazovaniya/Educational Studies Moscow
No 3, 2020

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. "Educational Studies Moscow" strives for a multidisciplinary approach, covering traditional pedagogy as well as the sociology, economics and philosophy of education.

Conceptually, the journal consists of several parts:

- Theoretical materials and empirical research aimed at developing new approaches to understanding the functioning and development of education in modern society
- Papers on current projects, practical developments and policy debates in the field of education, written for professionals and the wider public
- Statistical data and case studies published as "information for reflection" with minimal accompanying text
- Information about and analysis of the latest pedagogical projects
- Reviews of articles published in international journals

Target audience: Leading Russian universities, government bodies responsible for education, councils from federal and regional legislatures, institutions engaged in education research, public organizations and foundations with an interest in education.

All papers submitted for publication in the "Educational Studies Moscow" journal undergo peer review.

Distributed by subscription and direct order
Subscription Index:
"Rospechat" Agency—82950
"Pressa Rossii" Agency—15163

Address
National Research University Higher School of Economics
20 Myasnitskaya St., Moscow, Russia 101000
Tel: +7 (495) 772 95 90 *22 037, *22 038
E-mail: edu.journal@hse.ru
Homepage: http://vo.hse.ru/en/

National Research University Higher School of Economics

Educational Studies Moscow

Table of contents
No 3, 2020

DISCUSSION

PRACTICE

REFLECTIONS ON . . .

Swedish School Results, Student Background, Competition and Efficiency

Christophe André, Jon Pareliussen, Hyunjeong Hwang

Received in March 2020

Christophe André
MSc, Senior Economist, OECD Economics Department. E-mail: christophe.andre@oecd.org
Jon Pareliussen
MSc, Economist, OECD Economics Department. E-mail: jon.pareliussen@oecd.org
Hyunjeong Hwang
PhD, Statistician, OECD Economics Department.E-mail: hyunjeong.hwang@oecd.org

Address: OECD, Economics Department, 2 rue André-Pascal, 75775 Paris Cedex 16.

Abstract. Sweden's declining results in the Programme for International Student Assessment (PISA) for 15-year olds and other international tests between 2000 and 2012 have raised concern about the efficiency of the Swedish school system, even though results improved recently. Furthermore, inequality in educational outcomes between socio-economic groups have widened. A specificity of the Swedish school system is that it allows free choice between public and private schools. This has triggered a lively debate on the implications of competition for school results and educational inequality. Against this backdrop, this paper presents an econometric analysis of lower secondary school performance in Sweden, using a panel covering most schools in the country over the period 2013–17. We find that for-profit private schools underperform non-profit and public schools on average, although with large heterogeneity. School competition is associated with lower results in schools with a high share of pupils from weaker socio-economic backgrounds, which is consistent with negative peer effects in left-behind schools. Panel Stochastic Frontier Analysis points to a relatively narrow distribution of inefficiency across schools, with relatively few schools performing very poorly after controlling for their resources and the socio-economic background of their pupils. These results call for better targeting resources towards supporting the pupils most in need and steering competition and school choice so that they benefit pupils from all socio-economic groups equally.

Keywords: Sweden, education, efficiency, competition, stochastic frontier analysis.

DOI: 10.17323/1814-9545-2020-3-8-36

Introduction

Sweden has a strong knowledge-based economy, which relies heavily on a highly skilled workforce. Declining results in the Programme for International Student Assessment (PISA) for 15-year olds, as well as in other international tests, between the early 2000s and 2012 have sparked a lively public and academic debate on the effectiveness and

efficiency of the Swedish education system. Even though Sweden's rankings climbed to seventh in reading, twelfth in mathematics and fourteenth in science among OECD countries in the 2018 PISA vintage [OECD, 2019], challenges remain, notably inequal results related to socio-economic status, which is comparable to other OECD countries, and declining performance among the lowest-performing pupils, partly due to rising immigration. School performance also attracted attention from foreign researchers, as the Swedish education system displays some unique characteristics. In particular, it is the only OECD country with a substantial for-profit school sector entirely funded by the public purse, which has turned it into a top spot for exploring the impact of competition on school results. As the decline in results started in the wake of a series of reforms, which decentralised the school system and introduced choice, competition and management by objectives in the early 1990s, there is a presumption that these reforms may have contributed to weakening educational performance. However, other factors may influence test results, including cost savings in the public sector triggered by the 1990s economic crisis, rising immigration from non-European countries and growing socio-economic inequality. Hence, it is essential to disentangle the different factors affecting school results to design adequate policy responses.

This article presents an econometric analysis of school performance, as measured by average scores in national mathematics tests in a panel of Swedish lower secondary schools covering the period 2013–17. It includes both conventional school-level panel regressions and stochastic frontier analysis (SFA), which sheds light on the level and distribution of school inefficiency.

The main findings are as follows:

- Non-profit private school results are on par with those of public schools, but for-profit schools show somewhat lower results on average, controlling for other factors. However, this effect masks large heterogeneity across schools. The under-performance of for-profit schools is more pronounced in schools with a weaker socio-economic mix of pupils, while non-profit private schools over-perform in that category of schools.
- An indicator of competition, based on the density of schools in the vicinity of each school, is negatively associated with test scores, albeit only in schools with a weak socio-economic mix of pupils. This result is confirmed using the share of pupils in private schools by municipality as a competition indicator.
- The relation between inputs and test scores varies between schools with weak and strong socio-economic mixes of pupils. In particular, the positive association between test scores and both spending per pupil and the share of certified teachers is stronger in weaker schools.
- Panel Stochastic Frontier Analysis indicates that relatively few

Swedish schools perform very poorly once educational inputs and pupil socio-economic characteristics are taken into account.

- Overall, our results suggest that better targeting resources towards the pupils most in need and better steering competition and school choice, so that they benefit pupils from all socio-economic groups equally, has potential to improve school results.

Overview of Swedish secondary education

Compulsory education is provided in one single structure covering children aged 6 to 16, corresponding to primary school and lower secondary school (ISCED levels 1 and 2). About 1,024,000 pupils were enrolled in the Swedish compulsory school system in the school year 2016/17. Most pupils attended municipal schools, while 154,000 (approximately 15%) attended private (including international) schools. The school system has been decentralised since the early 1990s. Municipalities and private school providers are responsible for primary and secondary schools, including organisational development and control, and teacher training and competence development. School funding is set at the discretion of each municipality, with the exception of some targeted state grants.

Compulsory school pupils are entitled to a place in a municipal school based on proximity, but may choose another municipal school (usually within the municipality) or private school (regardless of location), subject to availability of vacancies. Private providers have their own admission systems, which need to be non-discriminatory. The usual admission criteria are siblings already admitted, geographical proximity and the time of application (first-come-first-served). Upper secondary admission is based on compulsory school grades, and not limited by municipal borders.

Rules guiding private schools are designed to create a level playing field between public and private schools. Private schools can be freely established following approval by the Swedish Schools Inspectorate. They follow the same rules as public schools, and teach the same curriculum (except for international schools), and they are subject to the same inspection regime as municipal schools.

Municipalities are compelled to finance compulsory and upper secondary education of resident children, including children attending a private school or a school run by a different municipality. Funding of resident children attending schools other than those run by the municipality is based on the actual cost of provision or the cost of organising the same programme in public schools in the home municipality. Schools (private and public) are not allowed to charge tuition fees.

Literature Review

A vast literature provides broad analysis of Swedish school result developments, effects of the 1990s reforms, inequality in education, segregation, and related policy issues [Gustafsson et al. 2016; OECD2015;

Swedish School Commission 2017; Swedish National Agency for Education 2018a]. We will focus on studies more closely related to this paper, namely those investigating the links between school competition and educational outcomes and those analysing efficiency using stochastic frontier analysis (SFA).

Several studies find a positive relationship between school competition and results in Sweden. Sandström and Bergström [2005], using a large sample of ninth graders in 34 municipalities in 1997/98, find a positive effect of competition, measured by the share of independent school pupils in the municipality, on national mathematics test scores and grades of public school pupils. Heller Sahlgren [2011], using school-level data from all Swedish schools with at least fifteen ninth grade pupils in 2005–09, finds that school competition improved educational attainment, as measured by grades. Böhlmark and Lindahl [2015] find positive effects from the share of pupils attending private schools on average grades within a municipality using a dataset covering ninth graders in the period 1988–2009. Wondratschek et al. [2013] use a measure based on the number of schools in the vicinity of pupils' homes covering the period 1987–2006, and find a significant but very small positive effect from having more choices available on marks at the end of compulsory schooling. Edmark et al. [2014] find that pupils from disadvantaged socio-economic groups or with an immigrant background did not benefit less than other children from the Swedish 1992 school choice reform.

However, Yang Hansen and Gustafsson [2016], using a counterfactual approach to differentiate school segregation from residential segregation, and Böhlmark et al. [2016], exploiting variation in school choice opportunities across municipalities, find evidence that segregation between natives and immigrants, and between pupils from different socio-economic backgrounds, has increased with school choice. Hinnerich and Vlachos [2017], with a value added approach (i. e. taking into account past achievements of pupils), find that pupils at upper-secondary voucher schools achieve on average somewhat lower scores on externally graded standardised tests in first year core courses, especially under-achieving pupils, but not immigrants.

A positive impact of competition on education outcomes is found in some US states. Borland and Howsen [1992] find that an increase in the degree of market concentration, measured by a Herfindahl index, lowers pupil achievement (standardised test scores) in Kentucky in 1989–90. Blair and Staley [1995], using school-district data from the six largest metropolitan statistical areas in Ohio, find a small positive influence of competition, measured by average test scores in neighbouring school districts, on standardised test scores. Dee [1998] finds that increased competition from private schools, measured by the proportion of pupils attending such schools, has a positive and significant impact on pupil attainment (high school graduation rates) in public schools, with data covering school districts in 18 US states in 1993–

94. Millimet and Collier [2008] apply a two-stage procedure to Illinois public school district data for 1997–98. First, they derive efficiency scores from a production function. Then, they estimate a spatial model to assess whether a school district's efficiency is affected by neighbouring districts' efficiency and find some evidence of positive spillovers, albeit depending on the school district's financial environment.

Misra et al. [2012] develop a Geographical Information System (GIS)-based school competition index for Mississippi, which they use as an explanatory variable for efficiency scores estimated through a production function. They find that competition from private schools increases public primary and high school efficiency significantly. Akyol [2016], using an agent-based simulation model of a representative US school district, finds that universal vouchers (as used in Sweden) have an ambiguous effect on pupils from low-income families. While pupils moving to better schools benefit, those staying in disadvantaged schools suffer from a negative peer effect, as pupils with higher abilities or from higher income families are more likely to change school. Targeted vouchers, subsidising pupils with lower abilities, are found to bring school districts the benefits of competition, while preventing the peer group deterioration observed with universal vouchers.

A number of studies look at Chile, which introduced school choice in 1981 through a national voucher programme. About half of lower secondary education pupils were enrolled in government dependent private institutions in 2017. Chile was the only OECD country with Sweden to have a large publicly funded for-profit sector, until it ended public funding of for-profit schools on equity grounds in 2015 [Pareliussen et al. 2019]. Notable differences between the Chilean and Swedish voucher programmes are that Chilean voucher schools have been allowed to charge additional tuition fees since 1993 and to select pupils since 2009 [Navarro-Palau 2017]. Hsieh and Urquiola (2006) find no evidence that choice improved average educational outcomes, such as test scores, repetition rates and years of schooling. They find evidence of increased sorting, with the best public school pupils tending to leave for private schools, a result confirmed by Elacqua [2012]. Navarro-Palau [2017] studies the impact of a further reform in 2008, which made vouchers dependent on the pupil's family income. She finds no improvement in the test scores of pupils most likely to move to private schools, but a rise in the test scores of pupils most likely to stay in public schools, suggesting the latter may have responded to increased competition by enhancing teaching quality.

Two studies use SFA to evaluate the efficiency of Swedish schools. Heshmati and Kumbhakar [1997] provide a SFA of Swedish primary and secondary schools in 1993–94. The analysis is very different from the one conducted in this paper, as the output variable is the number of pupils rather than average test scores. The study finds an average efficiency level of 90–92%, with a relatively narrow distribution. Holmberg [2017]'s analysis is closer to our paper. He performs a SFA of

the efficiency of Swedish secondary schools from 2006/07 to 2015/16, using the average grade across subjects for ninth grade pupils as the output variable. The share of independent schools in the municipality, which is interpreted as a proxy for local competition, has a positive impact on results. Efficiency estimates are above 96% in all cases. However, the methodology applied by Holmberg [2017] is likely to overestimate efficiency. Indeed, Greene [2005]'s true random effects model is applied after a within-transformation of the data (i. e. on demeaned data), which wipes out any time-invariant inefficiency.

A number of studies use SFA to analyse the performance of education institutions in other countries. Conroy and Arguea [2008] look at public elementary schools in Florida in 1997–98, using mathematics and reading test scores as outputs. Average efficiency ranges from 94.9% to 95.9% depending on the output measure and the region of the State. Pereira and Moreira [2007] investigate the efficiency of secondary schools in Portugal, using the average score in the twelfth grade national examinations as output. SFA is performed on cross-sectional data for 2004–05 and on panel data for the same school year and the preceding one. The average efficiency scores are 93% to 94% in the cross-sectional analysis and 83% to 88% in the panel analysis, according to specifications. Private schools perform significantly better than public schools, essentially reflecting strong performance at the higher end of the distribution. Kirjavainen [2012] evaluates the efficiency of Finnish general upper secondary schools in 2000–04, using a range of panel SFA models. The output is the school's average score in the compulsory tests in the matriculation examination. Average inefficiency estimates vary depending on the model used, but most estimates range from 93% to 97%. Dancer and Blackburn [2017] study the efficiency of New South Wales (Australia) secondary schools in 2005–10. The output variable is the average score in the Higher School Certificate examinations at the end of Year 12. Average efficiency is about 96%, but with a long tail of relatively inefficient schools.

Sutherland et al. [2007] present a SFA school-level analysis covering a sample of 6204 schools in 30 OECD countries in 2003. This study, which uses OECD's Programme for International Pupil Assessment scores as the output measure, is a useful complement to country-specific analyses, as it provides efficiency estimates relative to an international efficiency frontier. The inputs include educational resources as well as a synthetic indicator of the socio-economic background of pupils. Median school-efficiency is 96% and 90% of schools are within a 10 percentage point range (in the preferred specification, with exponential distribution). Median school-efficiency ranges from 91% to 97% depending on the country (95% for Sweden), with the interval encompassing 90% of schools varying between 4 and 23 percentage points (6 for Sweden).

Our paper contributes to the literature in two ways. First, it investigates the link between school competition and performance using a

density-based indicator in a panel of Swedish secondary schools between 2013 to 2017, controlling for a wide set of socio-economic and policy variables. Second, a panel stochastic frontier analysis (SFA) provides estimates of Swedish secondary schools efficiency.

Data and Descriptive Statistics

The empirical analysis is based on an unbalanced panel data set containing school-level and municipal-level data, covering 1,346 schools and 286 municipalities from 2013 to 2017.[1] The primary data source is the Swedish National Agency for Education's (Skolverket) online information system—SIRIS/SALSA [Swedish National Agency for Education, 2018b]. It provides school-level datasets on school performance, as well as teacher and pupil characteristics. Municipal-level data on demographics are collected from Statistics Sweden [Statistics Sweden, 2018a]. Finally, results from a survey of pupil satisfaction (Skolenkäten) are gathered from the Swedish School inspectorate [2018]. The data is merged by unique school and municipality identifiers.

Summary statistics are shown in Table 1. After removing a few outliers, the whole sample includes 4,878 observations, of which 3,735 relate to public schools (77%), 973 to for-profit schools (20%) and 170 to non-profit private schools (3%). The coverage varies slightly between years. On average over the five years, the sample covers two-thirds of the total number of schools, with a minimum of 58% in 2013 and a maximum of 72% in 2016.

The dependent variable is a simple school-level average mathematics score from the national test in the ninth grade. Vlachos [2018] finds evidence of systematic differences in grading standards between Swedish schools, and argues that the national test score in mathematics is more reliable than other subject scores, as grading is less subjective. The Swedish School Inspectorate [2013] found that mathematics has the smallest discrepancy between external and internal assessments among the core subjects in national tests, which also include Swedish and English.

The independent variables include a competition indicator based on school density, whose construction is described in the methodological section below, and a range of policy and socio-economic indicators. Four policy variables reflecting policy choices which can affect school performance. Spending per pupil refers to total expenditure on compulsory schools divided by the total number of pupils at the municipal level. According to the definition provided by Skolverket, the cost includes staff, teaching tools, school libraries, school management, administration, and professional development of teachers and staff. The school-level share of certified teachers qualified to teach in their subject (here mathematics) is a commonly used predictor of pu-

[1] The dataset expands in time and scope the dataset used in Vlachos (2018).

Table 1. **Summary statistics of main variables**

	Mean	Standard deviation	Min	Max
Whole sample				
Mathematics test score	11.5	2.1	2.9	18.9
Policy variables				
Spending per pupil (SEK)	96,555	10,220	72,800	137,800
Pupils per teacher	12.6	2.4	1.6	42.1
Share of certified teachers (%)	72.1	20.5	0.0	100.0
Adaptation to pupil needs	6.9	0.6	4.5	8.8
Socio-economic variables				
Share of new immigrants (%)	4.4	6.4	0.0	51.0
Share of boys (%)	51.8	9.0	0.0	100.0
Parent education level (index)[a]	2.3	0.2	1.3	3.0
Competition				
Density	0.8	1.0	0.0	5.6

[a] Education level is based on both parents highest educational attainment and runs from 1 to 3.

pil achievement. It is often considered the most reliable among various measures of teacher quality [Darling-Hammond 2000]. The pupils-to-teacher ratio is the number of pupils divided by the number of full-time equivalent teachers at the school level. Adaptation to pupil needs is based on the School Inspectorate's Pupil Satisfaction Survey (*Skolenkäten*). The questionnaire contains a total of 14 items on the school climate, such as conditions for learning, physical safety and emotional support. Each survey question is given as a statement, and pupils are asked to assess whether this statement corresponds to their own experience on a four-point scale ranging from "corresponds completely" to "does not correspond at all". "I do not know" is included as a fifth option. These answers are translated into numerical scores of 10, 6.67, 3.33 and 0, respectively, and answers of "I do not know" are excluded. The variable used in our main analysis is the school-level score under item four, "Adaptation to the pupil's needs", which is the average of responses to three questions/statements ("I can get extra tutoring if I should need it", "My teachers help me with my school work when I need it" and "School work is difficult for me"). Consistency checks are carried out with the 13 other survey items. As the survey items are positively correlated at the 1% significance level, only one at a time is included in the regressions to avoid multicollinearity.

Differences in the socio-economic background of pupils are controlled for by the share of newly arrived migrants, and the education level of parents. The share of boys is also included to account for systematic differences in results between genders. The share of new immigrants is defined as the share of pupils who immigrated less than four years before completing compulsory education. The education level of parents is measured with an index where each parent is assigned a score of one if their highest-achieved level of education is at the lower secondary level or below, two if it is upper secondary education, and three if it is tertiary education. The index value is the parents' average education level, ranging from one to three. Dummies for the school owner (municipal, private for-profit and private non-profit) and for the functional labour market regions (LA-regions) centred on the three main agglomerations of Stockholm, Gothenburg and Malmö are added.[2]

The average policy settings and pupil characteristics vary across types of schools (Table 2). The average mathematics test score is highest in non-profit private schools, followed by for-profit schools. Spending per pupil is also somewhat higher in private than in public schools, reflecting differences in location, as municipalities are compelled to fund private and public schools equivalently. For-profit schools have a markedly lower share of certified teachers than other schools. Private schools are perceived to adapt education better to pupil needs, and non-profit schools even more so than for-profit schools. Private school pupils have on average more favourable socio-economic characteristics, with far fewer new immigrants, a lower share of boys, and parents with higher average education attainment. They are also more subject to competition as they are on average located in areas with a higher density of schools.

Empirical Analysis Methodology

The model estimates a production function of educational outcomes, using standard panel regressions, as well as panel stochastic frontier analysis. The basic model can be written as follows:

(1) $$y_{it} = \alpha + \mu_i + \gamma_t + \beta\, x_{it} + \delta w_i + \varepsilon_{it},$$

where y_{it} is the natural logarithm of average mathematics test result of school i in year t, α is a constant, μ_i are school effects, γ_t are year fixed effects accounting for the variation in average test scores over time, x_{it} is a matrix of time-varying variables, w_i is a matrix of time-invariant variables and ε_{it} are random errors.

The full model in equation (1) can only be estimated using random school effects, as it includes time-invariant variables. However, the

[2] Functional labour market regions are based on commuting patterns in the LA15 update from Statistics Sweden (2018b).

Table 2. **Averages by type of schools and tests for differences**

	Averages by group				
	Public	For-profit[a]		Non-profit[b]	
Dependent variable					
Mathematics test score	11.3	12.2	***	13.6	***/***
Policy variables					
Spending per pupil (SEK)	96,143	97,579	**	99,710	***/***
Pupils per teacher	12.3	14	***	12.3	/***
Share of certified teachers (%)	73.6	66.2	***	72.3	***/**
Adaptation to pupil needs	6.9	7.1	***	7.4	***/**
Socio-economic variables					
Share of new immigrants (%)	5.4	0.9	***	1.3	***/
Share of boys (%)	52.6	50	***	46.3	***/***
Parents' education (index)	2.2	2.4	***	2.5	***/***
Competition					
Density	0.7	1.0	***	1.5	***/***

Note: ***,** and * indicate significant difference between the means of two groups at the 1%, 5% and 10% level, respectively.

[a] The significance tests are conducted for the comparison with public schools.

[b] The significance test results are reported for comparisons with public schools (left) and for-profit schools (right).

random effect (RE) model assumes the absence of correlation between the school effects and the regressors, an assumption which may not hold, in which case the RE coefficients would be biased and inconsistent. In that case, the fixed effects (FE) model would yield unbiased estimators, but it also has significant drawbacks. First, it does not allow the inclusion of time-invariant regressors, in particular the variable measuring the adaptation of education to pupil needs, for which only one point in time is available. Second, the FE model simply ignores cross-sectional information. In a sample where the number of schools is far larger than the number of years, this is likely to result in a huge loss of information. Finally, while the FE model yields unbiased and consistent estimates of the slope coefficients, it does not yield consistent estimates of the fixed effects, because of the incidental parameters problem (i. e. the number of parameters increases with the number of cross-sections). While this is a minor issue in traditional panel regressions, where the value of the fixed effect may be of limited interest, it has serious implications for the stochastic fron-

tier analysis performed later in this paper, as it is bound to affect the efficiency estimates [Belotti et al. 2013]. Hence, in this paper we prefer the RE model, despite its potential statistical limitations.

The competition indicator constructed to test the relationship between school competition and results in this article follows a similar logic as Wondratscheck et al. [2013] and Misra et al. [2012], although contrary to the latter, we do not take into account the size of schools, as there is no clear rationale for assuming that larger schools are more attractive than smaller ones in general. Parents in Sweden are allowed to freely choose the school in which to place their children. Among municipal schools the choice is limited to the schools within the municipality of residence, while attendance at private schools is not limited by municipal borders. The indicator is therefore constructed such that competition for private schools comes not only from the same municipality but also from neighbouring municipalities in border areas. Therefore, for private schools, competing schools can be any type of school (i. e. private or public) within a specified travel time. For public schools, competition comes from public schools in the same municipality and private schools within the specified travel time. Travel times between any pair of schools within our dataset are retrieved using the STATA user-written syntax '*georoute*'.[3] Travel time refers to the time to drive the distance under normal traffic conditions. The main indicator, the "density" indicator of competition, is constructed by simply counting the number of competing schools within a 15-minute radius. An alternative indicator, the "distance" competition indicator was calculated in a gravity-inspired framework.

To evaluate the efficiency of Swedish schools, we perform panel stochastic frontier analysis (SFA), which measures inefficiency as a distance to a production frontier. As schools can only be located below the frontier, the error term is skewed. Hence, equation (1) can be modified as follows:

$$(2) \quad y_{it} = \alpha + \mu_i + \gamma_t + \beta x_{it} + \delta w_i + v_{it} - u_{it},$$

where v_{it} is a normally distributed random error and u_{it} is a positive or nil inefficiency term. u_{it} is assumed to follow an exponential distribution, but a robustness check is carried out assuming a half-normal distribution.

Several variants of the SFA model described in equation (2) have been proposed in the literature. In this article, the "true" random effects variant [Greene 2005] is used. Its main advantages are to allow time-variation in inefficiency, without imposing a deterministic structure on its time path, and to better separate inefficiency from time-invariant heterogeneity than earlier models.

[3] For more detail, see Weber and Péclat [2017].

Ordinary Panel Regressions

We start with an ordinary panel regression of mathematics test scores on school type, socio-economic and policy variables, indicators for the three largest municipalities and the density-based competition indicator, including random school effects and time fixed effects on the full school sample (Table 3, first column). The density-based competition indicator is close to zero and not statistically significant. As expected, parents' education has a strong positive influence on test scores, while the share of new immigrants and to a lesser extent the share of boys have a negative impact. The strong impact of socio-economic variables on school results is in line with the literature [Björklund, Salvanes 2011; Smidova 2019]. Average test scores are higher in the big municipalities, notably Stockholm, than in the rest of the country. Spending per pupil, the share of certified teachers and the adaptation to pupils needs are all significant at the 1% level, with the expected positive signs. Conversely, the number of pupils per teacher is statistically insignificant. When controlling for these factors, non-profit schools do not differ from public schools, but for-profit schools have lower results.

Next, we run the same regression on two sub-samples of schools, corresponding to the bottom and top quartiles of the school distribution, sorted on an indicator of the socio-economic characteristics of their pupils.[4] This allows us to assess whether competition has a different impact across groups of pupils. The competition indicator is associated with weaker results in the bottom part of the distribution, while there is no such effect in stronger schools. In addition, both the share of certified teachers and spending per pupil are significantly correlated with school results in the bottom quartile, but not in the top quartile, suggesting that these inputs matter more for disadvantaged schools. Other interesting results emerge from these regressions. While the coefficient of adaptation of education to pupil needs is significant in all samples, its magnitude is greater for schools where pupils come from less favourable socio-economic backgrounds. For-profit schools achieve significantly lower average scores than public schools at the 10% significance level in the bottom quartile, but not statistically different results in the top quartile. Non-profit private schools have better results than public schools in the bottom socio-economic quartile, but not in the top quartile. The share of new immigrants has a significant negative effect both in the top and bottom quartiles, although somewhat stronger in the bottom. Finally, results in Stockholm, Goth-

[4] The indicator is constructed by predicting counterfactual national mathematics test scores using the regression coefficients of the socio-economic variables. All other variables in the equation are assumed to take a constant value, equal for all schools. The schools are thus ranked according to the predicted test scores assuming the only difference between them is the share of newly arrived migrants, the share of boys and the parental education level.

Table 3. **Ordinary panel regressions**

		Sub-sample	
	FULL-sample	Bottom quartile	Top quartile
Policy variables			
Spending per pupil	0.091***	0.180**	0.0468
Pupils per teacher	0.000	-0.000	0.002
Share of certified teachers	0.080***	0.112***	0.022
Adaptation to pupil needs	0.050***	0.056***	0.035***
School type			
For-profit	-0.028***	-0.049*	-0.012
Non-profit	0.006	0.191**	0.006
Socio-economic variables			
Share of new immigrants	-0.308***	-0.407***	-0.263**
Share of boys	-0.060**	-0.146**	-0.048*
Parents' education	0.442***	0.461***	0.391***
Municipality			
Stockholm	0.050***	0.008	0.079***
Gothenburg	0.026***	0.015	0.041***
Malmö	0.035***	0.022	0.051***
Competition			
Density	-0.005	-0.025**	0.002
Constant	0.077	-0.951	0.797*
R^2 Overall	0.521	0.330	0.416
R^2 Within	0.287	0.316	0.247
R^2 Between	0.598	0.263	0.428

Note: Year fixed effects are included in all regressions. The total number of observations is 4878 for the full-sample regressions, representing 1140 schools. ***,** and * indicate significance at respectively the 1%, 5% and 10% level. Robust standard errors (clustered) are used. Quartiles are calculated after sorting schools according to the socio-economic characteristics of their pupils.

enburg and Malmö are not significantly different from the rest of the sample in the bottom quartile, but higher in the top quartile, suggesting some polarisation in these cities.

Stochastic Frontier Analysis

The results of our equation with all variables estimated using the "true" random effect SFA model with an exponential distribution of inefficien-

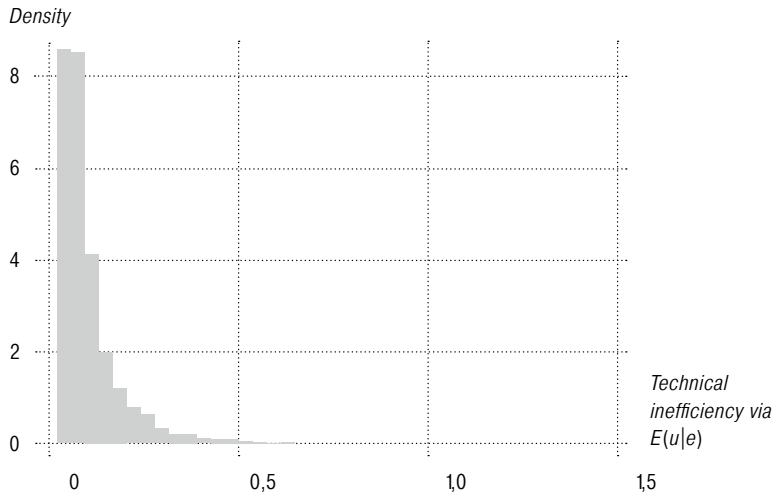
Table 4. **Stochastic frontier analysis**

	SFA	
Model type	Exponential	Half-normal
Policy variables		
Spending per pupil	0.063***	0.074***
Pupils per teacher	-0.001	-0.001
Share of certified teachers	0.046***	0.053***
Adaptation to pupil needs	0.040***	0.042***
School type		
For-profit	-0.000	-0.006
Non-profit	0.024	0.023
Year		
2014	-0.070***	-0.069***
2015	-0.104***	-0.106***
2016	-0.020***	-0.019***
2017	-0.111***	-0.115***
Municipality		
Stockholm	0.048***	0.049***
Gothenburg	0.027***	0.027***
Malmö	0.039***	0.039***
Socio-economic variables		
Share of new immigrants	-0.247***	-0.250***
Share of boys	-0.049**	-0.049**
Parents' education	0.371***	0.382***
Competition		
Density	-0.002	-0.004
Constant	0.737***	0.606**
Lambda[a]	1.79***	3.97***
Average inefficiency (%)	9.2	12.3
Sample		
Observations	4878	4878
Schools	1140	1140

Note: ***,** and * indicate significance at respectively the 1%, 5% and 10% level. Robust standard errors (clustered) are used.

[a] Lambda is the ratio of the variances of the asymmetric and symmetric errors.

Figure 1. **Distribution of inefficiency scores**



Source: Authors' calculations.As the literature points out that similar average levels of inefficiency may hide important variations in individual school efficiency scores and rankings [Greene 2005], we checked correlations and rank (Spearman) correlations between the efficiency scores from the two SFA models. They are above 95%, indicating that the models yield very similar individual school scores and rankings.

cy are displayed in the first column of Table 4. The results are qualitatively similar to the ordinary panel model results shown in the first column of Table 3, despite some differences in the magnitude of coefficients. The only difference in coefficient statistical significance relates for-profit schools, which are found to perform below average in the ordinary panel regression, but not significantly so in the SFA model. This presumably reflects the limited role these schools play in shaping the efficiency frontier. In SFA, their weaker performance is rather reflected in higher inefficiency scores.[5]

The lambda coefficient, which is the ratio of the variances of the asymmetric and symmetric errors, is significantly different from zero at the 1% confidence level, indicating that inefficiencies are present and validating the use of a SFA model. Average inefficiency is slightly above 9% and the distribution of efficiency scores is fairly narrow (Figure 1). Only about a tenth of inefficiency scores are above 20%, which is a relatively moderate share in statistical terms. For comparison, the standard deviation of test scores is about 18% of the mean. Nonethe-

[5] The average inefficiency scores are 10.7% for for-profit schools, 9.9% for public schools and 8.6% for non-profit schools.

less, low efficiency can have severe consequences for the pupils attending inefficient schools. As SFA estimates may be sensitive to the assumption on the distribution of the inefficiency term, we replicate the estimation assuming a half-normal instead of an exponential distribution (Table 4, second column). The results are very close, even though the level of inefficiency is somewhat higher under the half-normal assumption (approximately 12%).

Robustness Checks

To check the robustness of the results, we run a range of additional regressions.[6] First, to verify the stability of the coefficients, we estimate the main equation (Table 3, first column) without policy variables and with only one policy variable at a time. The coefficients are very close to those of the equation including all variables. It is worth noting, however, that when the share of certified teachers is omitted, private schools, particularly for-profit ones, seem to perform slightly worse. This is because these schools have a below-average share of certified teachers, as can be seen from Table 2. Conversely, when the adaptation to pupils needs variable is omitted, the performance of private schools appears to increase somewhat, because private schools (both for-profit and non-profit) score better than public schools on this variable. Both the share of certified teachers and the adaptation to pupil needs are, to some extent, under the control of schools, calling for caution in the interpretation of the school-type coefficients. Moreover, average results mask wide variation across schools.[7] Second, the indicator variables for the three main cities are replaced by fixed effects for all municipalities. This allows checking that uncontrolled heterogeneity across municipalities is not biasing our results. The coefficients are roughly unchanged for most variables. Third, we use alternative measures of competition. We replace the school density indicator by the share of pupils attending private schools, in the spirit of Böhlmark and Lindahl [2015]. The results are similar to those found with the density indicator, except that negative competition effects are also significant for the full-sample regression. Then, we use the distance indicator of competition, which yields similar results as the density indicator. Fourth, we replace the measure of adaptation of education to pupil needs by other survey measures of school organisation, basic values and learning environment, which barely alters the results.

---

[6] To save space the results are not shown, but are available from the authors on request.

[7] When the equation in the first column of Table 3 is estimated including five dummies for separate groups of private schools, independent or belonging to different companies, instead of a single dummy representing all for-profit schools, the coefficient of these dummies range from –0.035 (significant at the 5% level) to +0.115 (significant at the 1% level). This illustrate the heterogeneity among for-profit schools.

Discussion

School competition is negatively associated with results in schools with the least favourable socio-economic mix of pupils, although only weakly. This result is consistent with findings from Yang Hansen and Gustafsson [2016] and Böhlmark et al. [2016], but opposite to the results found by Wondratschek et al. [2013], Edmark et al. [2014] and Böhlmark and Lindahl [2015]. However, these studies analysed older data, ending between 2006 and 2009. A possible interpretation of differences in results is thus that the effects from competition have changed over time. Research shows that the impact of school choice on educational performance varies across countries, depending in particular on framework conditions and implementation, school autonomy and policy guidance. The ability of the education system to provide real, relevant and meaningful choice is also essential to ensure equity and narrow between-school variation in performance [OECD2017]. Pupils from more favourable backgrounds utilise school choice to sort into higher-performing schools, while school choice is less utilised by pupils from less favourable backgrounds. Lower-achieving pupils in Sweden lose more than higher-achievers gain from school and classroom segregation [Sund 2009]. These asymmetric peer effects combined with increasing school segregation could turn the previous positive effect from school competition negative. This would be consistent with some results found in the United States [Akyol 2016] and Chile [Hsieh, Urquiola 2006; Elacqua 2012], even though one needs to keep in mind differences in the education systems and socio-economic conditions between these countries and Sweden.

The lower performance of for-profit schools compared to public and non-profit schools, after controlling for other factors, calls for further investigation. This result is strongest in schools catering to lower socio-economic groups. Private schools are perceived as adapting education better to pupils' needs on average, which calls for a cautious interpretation. As controls for the socio-economic background of pupils at the school level are relatively crude, one cannot rule out that lower performance results from a higher level of pupil disadvantage. An analysis at the pupil level would be needed to reach firmer conclusions on the relative performance of for-profit schools.

The average level of inefficiency is about 10%, implying that schools could increase their average mathematics test score by on average 10% for a given level of inputs. The distribution is relatively narrow. Less than a tenth of inefficiency scores are greater than one standard deviation in test scores. Even though relatively few schools have low efficiency, the consequences for their pupils can be serious, and low scores imply a potential to improve results by moving closer to the efficient frontier. As efficiency scores depend on modelling assumptions, notably regarding time variation in efficiency [Greene 2005], they should be interpreted with caution. Nevertheless, the analysis suggests that while some Swedish schools could achieve ef-

ficiency gains, few are very far from the efficiency frontier when educational inputs and pupil socio-economic characteristics are taken into account.

Altogether, our results suggest that improving educational results requires better targeting resources towards supporting the pupils most in need and steering competition and school choice so that they benefit pupils from all socio-economic groups equally.

References

Akyol M. (2016) Do Educational Vouchers Reduce Inequality and Inefficiency in Education? *Economics of Education Review*, vol. 55, iss. C, pp. 149–167. https://doi.org/10.1016/j.econedurev.2016.10.001

Belotti F. et al. (2013) Stochastic Frontier Analysis Using Stata. *The Stata Journal*, vol. 13, no 4, pp. 719–758. Available at: https://www.stata-journal.com/article.html?article=st0315 (accessed 10 August 2020).

Borland M. V., Howsen R. M. (1992) Student Academic Achievement and the Degree of Market Concentration in Education. *Economics of Education Review*, vol. 11, no 1, pp. 31–39. https://doi.org/10.1016/0272–7757(92)90019-Y

Björklund A., Salvanes K. (2011) Education and Family Background: Mechanisms and Policies. *Handbook of the Economics of Education* (eds E. Hanushek, S. Machin, L. Woessmann), North Holland: Elsevier, vol. 3, pp. 201–247.

Blair J. P., Staley S. (1995) Quality Competition and Public Schools: Further Evidence. *Economics of Education Review*, vol. 14, no 2, pp. 193–198. https://doi.org/10.1016/0272–7757(95)90398-R

Böhlmark A., Lindahl M. (2015) Independent Schools and Long Run Educational Outcomes: Evidence from Sweden's Large-Scale Voucher Reform. *Economica*, vol. 82, no 327, pp. 508–551. http://dx.doi.org/10.1111/ecca.12130

Böhlmark A., Holmlund H., Lindahl M. (2016) Parental Choice, Neighbourhood Segregation or Cream Skimming? An Analysis of School Segregation after a Generalized Choice Reform. *Journal of Population Economics*, vol. 29, no 4, pp. 1155–1190. https://doi.org/10.1007/s00148–016–0595-y

Conroy S. J., Arguea N. M. (2008) An Estimation of Technical Efficiency for Florida Public Elementary Schools. *Economics of Education Review*, vol. 27, no 6, pp. 655–663. https://doi.org/10.1016/j.econedurev.2007.08.002

Dancer D., Blackburn V. (2017) What Are the Effective Public Schools? Insights from New South Wales' Secondary Schools Using a Stochastic Frontier Analysis with a Panel Dataset. *Australian Journal of Education*, vol. 61, no 2, pp. 141–163. https://doi.org/10.1177/0004944117713555

Darling-Hammond L. (2000) Teacher Quality and Student Achievement: A Review of State Policy Evidence. *Education Policy Analysis Archives*, vol. 8, no 1. https://doi.org/10.14507/epaa.v8n1.2000

Dee T. S. (1998) Competition and the Quality of Public Schools. *Economics of Education Review*, vol. 17, no 4, pp. 419–427. https://doi.org/10.1016/S0272–7757(97)00040-X

Edmark K., Frölich M., Wondratschek V. (2014) Sweden's School Choice Reform and Equality of Opportunity. *Labour Economics*, vol. 30, October, pp. 129–142. https://doi.org/10.1016/j.labeco.2014.04.008

Elacqua G. (2012) The Impact of School Choice and Public Policy on Segregation: Evidence from Chile. *International Journal of Educational Development*, vol. 32, no 3, pp. 444–453. https://doi.org/10.1016/j.ijedudev.2011.08.003

Greene W. (2005) Reconsidering Heterogeneity in Panel Data Estimators of the Stochastic Frontier Model. *Journal of Econometrics*, vol. 126, no 2, pp. 269–303. http://dx.doi.org/10.1016/j.jeconom.2004.05.003

Gustafsson J., Sörlin S., Vlachos J. (2016) *Policyidéer för svensk skola* [Policy Ideas for Swedish Schools]. Stockholm: SNS. Available at: https://www.sns.se/wp-content/uploads/2016/07/policyideer_for_svensk_skola.pdf (accessed 10 August 2020).

Heller Sahlgren G. (2011) Schooling for Money: Swedish Education Reform and the Role of the Profit Motive. *Economic Affairs*, vol. 31, no 3, pp. 28–35. Available at: http://hdl.handle.net/10.1111/j.1468–0270.2011.02112.x (accessed 10 August 2020).

Heshmati A., Kumbhakar S. C. (1997) Efficiency of the Primary and Secondary Schools in Sweden. *Scandinavian Journal of Educational Research*, vol. 41, no 1, pp. 33–51. http://dx.doi.org/10.1080/0031383970410103

Hinnerich B. T., Vlachos J. (2017) The Impact of Upper-Secondary Voucher School Attendance on Student Achievement. Swedish Evidence Using External and Internal Evaluations. *Labour Economics*, vol. 47, pp. 1–14. https://doi.org/10.1016/j.labeco.2017.03.009

Holmberg J. (2017) *The Relative Efficiency of Swedish Secondary Schools. An Estimation Using Stochastic Frontier Analysis* (Master thesis). Umeå: Umeå University. Available at: http://urn.kb.se/resolve?urn=urn%3Anbn%3Ase%3Aumu%3Adiva-137601 (accessed 10 August 2020).

Hsieh C-T., Urquiola M. (2006) The Effects of Generalized School Choice on Achievement and Stratification: Evidence from Chile's Voucher Program. *Journal of Public Economics*, vol. 90, no 8–9, pp. 1477–1503. https://doi.org/10.1016/j.jpubeco.2005.11.002

Kirjavainen T. (2012) Efficiency of Finnish General Upper Secondary Schools: An Application of Stochastic Frontier Analysis with Panel Data. *Education Economics*, vol. 20, no 4, pp. 343–364. https://doi.org/10.1080/09645292.2010.510862

Millimet D. L., Collier T. (2008) Efficiency in Public Schools: Does Competition Matter? *Journal of Econometrics*, vol. 145, no 1–2, pp. 134–157. https://doi.org/10.1016/j.jeconom.2008.05.001

Misra K., Grimes P., Rogers K. (2012) Does Competition Improve Public School Efficiency? A Spatial Analysis. *Economics of Education Review*, vol. 31, no 6, pp. 1177–1190. http://dx.doi.org/10.1016/j.econedurev.2012.08.001

Navarro-Palau P. (2017) Effects of Differentiated School Vouchers: Evidence from a Policy Change and Date of Birth Cutoffs. *Economics of Education Review,* vol. 58, iss. C, pp. 86–107. https://doi.org/10.1016/j.econedurev.2017.03.008

OECD (2019) *PISA 2018 Results. Combined Executive Summaries*. Vol. I, II, III. Paris: OECD. Available at: https://www.oecd.org/pisa/Combined_Executive_Summaries_PISA_2018.pdf (accessed 10 August 2020).

OECD (2017) *School Choice and School Vouchers: An OECD Perspective*. Paris: OECD. Available at: http://www.oecd.org/education/School-choice-and-school-vouchers-an-OECD-perspective.pdf (accessed 10 August 2020).

OECD (2015) *Improving Schools in Sweden: An OECD Perspective*. Paris: OECD. Available at: http://www.oecd.org/education/school/Improving-Schools-in-Sweden.pdf (accessed 10 August 2020).

Pareliussen J., André C., Hwang H. (2019) *Improving School Results and Equity in Compulsory Education in Sweden. OECD Economics Department Working Paper No 1587.* Paris: OECD. https://doi.org/10.1787/99a20fbe-en

Pereira M. C., Moreira S. (2007) *A Stochastic Frontier Analysis of Secondary Education Output in Portugal. Bank of Portugal Working Paper No 6–2007*. Available at: https://www.bportugal.pt/sites/default/files/anexos/papers/wp200706.pdf (accessed 10 August 2020).

Sandström F. M., Bergström F. (2005) School Vouchers in Practice: Competition Will not Hurt You. *Journal of Public Economics*, vol. 89, no 2–3, pp. 351–380. https://doi.org/10.1016/j.jpubeco.2004.03.004

Smidova Z. (2019) *Educational Outcomes: A Literature Review of Policy Drivers from a Macroeconomic Perspective. OECD Economics Department Working Paper No 1577*. Paris: OECD. https://doi.org/10.1787/990801aa-en

Statistics Sweden (2018a) *Djupdykning i statistik om Sveriges kommuner* [Deep-Dive in Statistics about Sweden's Municipalities]. Available at: https://www.scb.se/hitta-statistik/sverige-i-siffror/djupdykning-i-kommunstatistik/ (accessed 10 August 2020).

Statistics Sweden (2018b) *Lokala arbetsmarknader* [Local Labour Market Regions] Available at: https://www.scb.se/hitta-statistik/statistik-efter-amne/arbetsmarknad/sysselsattning-forvarvsarbete-och-arbetstider/register-baserad-arbetsmarknadsstatistik-rams/produktrelaterat/Fordjupad-information/lokala-arbetsmarknader-la/ (accessed 10 August 2020).

Sund K. (2009) Estimating Peer Effects in Swedish High School Using School, Teacher, and Student Fixed Effects. *Economics of Education Review*, vol. 28, no 3, pp. 329–336. https://doi.org/10.1016/j.econedurev.2008.04.003

Sutherland D., Price R.W., Joumard I., Nicq C. (2007) *Performance Indicators for Public Spending Efficiency in Primary and Secondary Education. OECD Economics Department Working Paper No 546*. Paris: OECD. http://dx.doi.org/10.1787/285006168603

Swedish National Agency for Education (2018a) *Analyser av familjebakgrundens betydelse för skolresultaten och skillnader mellan skolor* (Analyses of Family Backgrounds Influence of School Results and Differences between Schools). Available at: https://www.skolverket.se/sitevision/proxy/publikationer/svid12_5dfee44715d35a5cdfa2899/55935574/wtpub/ws/skolbok/wpubext/trycksak/Blob/pdf3927.pdf?k=3927 (accessed 10 August 2020).

Swedish National Agency for Education (2018b) *SIRIS/SALSA Database*. Available at: https://www.skolverket.se/skolutveckling/statistik/sok-statistik-om-forskola-skola-och-vuxenutbildning (accessed 10 August 2020).

Swedish School Commission (2017) *Samling för skolan □ Nationell strategi för kunskap och likvärdighet* [Together for Schools—National Strategy for Knowledge and Equality]. Available at: http://www.regeringen.se/498092/contentassets/e94a1c61289142bfbcfdf54a44377507/samling-for-skolan—--nationell-strategi-for-kunskap-och-likvardighet-sou-201735.pdf (accessed 10 August 2020).

Swedish School Inspectorate (2018) *Statistik från Skolenkäten* [Statistics from the Student Satisfaction Survey]. Available at: https://www.skolinspektionen.se/sv/Statistik/statistik-fran-skolenkaten/ (accessed 10 August 2020).

Swedish School Inspectorate (2013) *Olikheterna är för stora, Omrättning av nationella prov i grundskolan och gymnasieskolan* [Differences Are Too Big, Re-grading of National Tests in Compulsory and Upper Secondary Schools, 2013]. Available at: https://www.skolinspektionen.se/globalassets/publikationssok/granskningsrapporter/omrattning/2013/omrattning-nationella-prov-2013.pdf (accessed 10 August 2020).

Vlachos J. (2018) *Trust-Based Evaluation in a Market-Oriented School System. IFN Working Paper No 1217*. Stockholm: Institutet för Näringslivsforskning (IFN). Available at: https://www.ifn.se/publikationer/working_papers/2018/1217 (accessed 10 August 2020).

Weber S., Péclat M. (2017) A Simple Command to Calculate Travel Distance and Travel Time. *The Stata Journal*, vol. 17, no 4, pp. 962–971. https://doi.org/10.1177/1536867X1801700411

Wondratschek V., Edmark K., Frölich M. (2013) The Short- and Long-Term Effects of School Choice on Student Outcomes—Evidence from a School Choice Reform in Sweden. *Annals of Economics and Statistics*, vol. 111/112, Special issue on education, pp. 71–101. Available at: https://www.jstor.

org/stable/pdf/23646327.pdf?refreqid=excelsior%3Aa335cb8a84f37e-0896b58a9b1018c305 (accessed 10 August 2020).

Yang Hansen K., Gustafsson J. (2016) Causes of Educational Segregation in Sweden—School Choice or Residential Segregation. *Educational Research and Evaluation*, vol. 22, no 1–2, pp. 23–44. http://dx.doi.org/10.1080/13803611.2016.1178589

Positive Psychological Interventions to Prevent Well-Being Issues, Aggression and Bullying in School Students

Authors

Artur Rean
Doctor of Sciences in Psychology, Academician of the Russian Academy of Education, Professor, Head of the Laboratory for Prevention of Antisocial Behavior, National Research University Higher School of Economics.
Address: Bld. 10, 16 Potapovsky Lane, 101000 Moscow, Russian Federation.
E-mail: profrean@mail.ru

Alexey Stavtsev
Master of Social Psychology, Research Psychologist, Enlightenment Steps Program, Sobranie Cultural Initiative Supporting and Preservation Fund.
Address: Bld. 3, 43 Bolshaya Polyanka Str., 119180 Moscow, Russian Federation.
E-mail: stavtsev.alex@yandex.ru

Abstract

Data obtained by Russian psychologists and sociologists is used to substantiate the need for school-based interventions to improve school climate and reduce overall peer aggression. Positive psychological interventions (PPIs) for wellbeing have a number of advantages over programs designed to reduce or eliminate negative behavioral manifestations, such as anti-bullying, anti-smoking, depression prevention, or violence prevention programs. In particular, PPIs are universal, flexible, and wide-reaching; they have a strong influence on such important life outcomes as positive emotions, involvement in something that one loves, harmonious social relations, adequate self-esteem, and the feeling of significance. Effectiveness of PPIs is evaluated using international literature as compared with descriptive studies of Russian researchers.

Keywords

positive psychology interventions, psychological well-being of school students, school bullying, school climate.

References

Bech P., Lunde M., Unden M. (2002) Social Adaptation Self-Evaluation Scale (SASS): Psychometric Analysis as Outcome Measure in the Treatment of Patients with Major Depression in the Remission Phase. *International Journal of Psychiatry in Clinical Practice*, vol. 6, no 3, pp. 141–146.

Bernard M., Walton K. (2011) The Effect of You Can Do It! Education in Six Schools on Student Perceptions of Wellbeing, Teaching, Learning and Relationships. *Journal of Student Wellbeing*, vol. 5, no 1, pp. 22–37.

Bochaver A., Khlomov K. (2014) Kiberbulling: travlya v prostranstve sovremennyh tekhnologij [Cyberbullying: Harassment in the Space of Modern Technologies]. Psychology. *Journal of the Higher School of Economics*, vol. 11, no 3, pp. 177–191.

Bolier L., Haverman M., Westerhof G. J. et al. (2013) Positive Psychology Interventions: A Meta-Analysis of Randomized Controlled Studies. *BMC Public Health*, vol. 13, art. no 119. DOI:10.1186/1471-2458-13-119.

Boniwell I., Osin E. N., Martinez C. (2016) Teaching Happiness at School: Non-Randomised Controlled Mixed-Methods Feasibility Study on the Effectiveness of Personal Well-Being Lessons. *The Journal of Positive Psychology*, vol. 11, no 1, pp. 85–98.

Boniwell I., Ryan L. (2009) *SPARK Resilience: A Teacher's Guide*. London: University of East London.

Bradshaw C. P. (2015) Translating Research to Practice in Bullying Prevention. *American Psychologist*, vol. 70, no 4, pp. 322–332.

Broderick P., Metz S. (2009) Learning to BREATHE: A Pilot Trial of a Mindfulness Curriculum for Adolescents. *Advances in School Mental Health Promotion*, vol. 2, iss. 1, pp. 35–46.

Cook C. R., Williams K. R., Guerra N. G., Kim T. E., Sadek S. (2010) Predictors of Bullying and Victimization in Childhood and Adolescence: A Meta-Analytic Investigation. *School Psychology Quarterly*, vol. 25, no 2, pp. 65–83.

Enikolopov S. (2011) Metody issledovaniya agressii v klinicheskoj psihologii [Methods of Aggression Research in Clinical Psychology]. *Diagnostika v meditsinskoj psikhologii: traditsii i perspektivy* [Diagnostics in Medical Psychology: Traditions and Perspectives] (eds N. Zvereva, I. Roshchina, S. Enikolopov), Moscow: MGPPU, pp. 82–100.

Flannery D. J., Todres J., Bradshaw C. et al. (2016) Bullying Prevention: A Summary of the Report of the National Academies of Sciences, Engineering and Medicine. *Prevention Science*, vol. 17, no 8, pp. 1044–1053.

Froh J., Kashdan T., Ozimkowski K., Miller N. (2009) Who Benefits the Most from a Gratitude Intervention in Children and Adolescents? Examining Positive Affect as a Moderator. *The Journal of Positive Psychology*, vol. 4, no 5, pp. 408–422.

Froh J., Sefick W., Emmons R. A. (2008) Counting Blessings in Early Adolescents: An Experimental Study of Gratitude and Subjective Well-Being. *Journal of School Psychology*, vol. 46, no 2, pp. 213–233.

Froh J., Yurkewicz C., Kashdan T. (2009) Gratitude and Subjective Well-Being in Early Adolescence: Examining Mechanisms and Gender Differences. *Journal of Adolescence*, vol. 32, no 3, pp. 633–650.

Grannis J. C. (1992) Students' Stress, Distress, and Achievement in an Urban Intermediate School. *The Journal of Early Adolescence*, vol. 72, no 1, pp. 4–27.

Green S., Anthony T., Rynsaardt J. (2007) Evidence-Based Life Coaching for Senior High School Students: Building Hardiness and Hope. *International Coaching Psychology Review*, vol. 2, no 1, pp. 24–32.

Huppert F. A., Johnson D. M. (2010) A Controlled Trial of Mindfulness Training in Schools: The Importance of Practice for an Impact on Well-Being. *The Journal of Positive Psychology*, vol. 5, no 4, pp. 264–274.

Jimenez-Barbero J.A., Ruiz-Hernandez J.A., Llor-Zaragoza L., Perez-Garcia M., Llor-Esteban B. (2016) Effectiveness of Anti-Bullying School Programs: A Meta-Analysis. *Children and Youth Services Review*, vol. 61, December, pp. 165–175.

Joseph S. (ed.) (2015) *Positive Psychology in Practice: Promoting Human Flourishing in Work, Health, Education, and Everyday Life*. Hoboken, NJ: John Wiley & Sons.

Kabat-Zinn J. (1994) *Wherever You Go, There You Are: Mindfulness Meditation in Everyday Life*. New York: Hyperion.

Keyes C. (2002) The Mental Health Continuum: From Languishing to Flourishing. *Journal of Health and Social Research*, vol. 43, no 2, pp. 207–222.

Leontiev D. (2012) Pozitivnaya psikhologiya: povestka dnya novogo stoletiya [Positive Psychology: An Agenda for the New Century]. *Psychology. Journal of the Higher School of Economics*, vol. 9, no 4, pp. 36–58.

Lovell B. L., Lee R. T. (2011) Impact of Workplace Bullying on Emotional and Physical Well-Being: A Longitudinal Collective Case Study. *Journal of Aggression, Maltreatment & Trauma*, vol. 20, no 3, pp. 344–357.

Marques S., Lopez S., Pais-Ribeiro K. (2011) Building Hope for the Future: A Program to Foster Strengths in Middle-School Students. *Journal of Happiness Studies*, vol. 12, no 1, pp. 139–152.

McGrath H., Noble T. (2003) *Bounce Back! Teacher's Handbook*. Sydney: Pearson Education.

Michaels R. J. (2010) *Transactions and Strategies: Economics for Management (with InfoApps)*. Toronto: Nelson Education.

Navarro R., Ruiz-Oliva R., Larrañaga E., Yubero S. (2015) The Impact of Cyberbullying and Social Bullying on Optimism, Global and School-Related Happiness and Life Satisfaction Among 10–12-year-old Schoolchildren. *Applied Research Quality Life*, vol. 10, iss. 1, pp. 15–36. https://doi.org/10.1007/s11482-013-9292–0

Norrish J. M., Seligman M. E. (2015) *Positive Education: The Geelong Grammar School Journey. Oxford Positive Psychology Series*. Oxford: Oxford University.

Novikova M., Rean A. (2019) Vliyanie shkolnogo klimata na vozniknovenie travli: otechestvennyi i zarubezhnyi opyt issledovaniya [Influence of School Climate on Bullying Prevalence: Russian and International Research Experience]. *Voprosy obrazovaniya/Educational Studies Moscow*, no 2, pp. 78–97. DOI:10.17323/1814-9545-2019-2-78-97.

OECD (2019) *PISA 2018 Results. Vol. III: What School Life Means for Students' Lives*. Paris: OECD. https://doi.org/10.1787/acd78851-en

Olweus D. (1993) *Bullying at School. What We Know and What We Can Do*. Oxford: Blackwell.

Olweus D., Limber S. P. (2010) Olweus Bullying Prevention Program: Implementation and Evaluation over two Decades. Available at: https://www.researchgate.net/publication/285822219_The_Olweus_Bullying_Prevention_Program_Implementation_and_evaluation_over_two_decades (accessed 10 July 2020).

Park N., Peterson C. (2009) Strengths of Character in School. *Handbook of Positive Psychology in Schools* (eds R. Gilman, E. S. Huebner., M. J. Furlong), New York: Routledge, pp. 77–88.

Park N., Peterson C. (2008) Positive Psychology and Character Strengths: Application to Strengths Based School Counseling. *Professional School Counseling*, vol. 12, no 2, pp. 85–92.

Park N., Peterson C., Seligman M. (2004) Strengths of Character and Well-Being. *Journal of Social and Clinical Psychology*, vol. 23, no 5, pp. 603–619.

Peterson C., Ruch W., Beermann U., Park N., Seligman M. E.P. (2007) Strengths of Character, Orientations to Happiness, and Life Satisfaction. *Journal of Positive Psychology*, vol. 2, no 3, pp. 149–156.

Peterson C., Seligman M. (2004) *The VIA Classification of Strengths*. Cincinnati: Values in Action Institute.

Popovic N. (2014) Should Education Have Happiness Lessons? *The Oxford Handbook of Happiness* (eds S. A. David, I. Boniwell, A. C. Ayers), Oxford: Oxford University, pp. 551–562.

Rambaran J. A., Dijkstra J. K., Veenstra R. (2019) Bullying as a Group Process in Childhood: A Longitudinal Social Network Analysis. *Child Development*, August. DOI:10.1111/cdev.13298.

Rean A. (2018) Profilaktika agressii i asocialnosti nesovershennoletnikh [Prevention of Aggression and Antisocial Behavior in Adolescents]. *Natsionalny Psikhologichesky Zhurnal/National Psychological Journal*, no 2 (30), pp. 3–12. DOI:10.11621/npj.2018.0201.

Rean A., Konovalov I. (2019) Proyavlenie agressivnosti podrostkov v zavisimosti ot pola i socialno-ekonomicheskogo statusa semji [Manifestation of the Aggression in Adolescents Depending on Gender and Socio-Economic Status of the Family]. *Natsionalny Psikhologichesky Zhurnal/National Psychological Journal*, no 1 (33), pp. 23–33. DOI:10.11621/npj.2019.0103.

Rean A., Novikova M. (2019) Bulling v srede starsheklassnikov Rossijskoj Federatsii: rasprostranennost i vliyanie socioekonomicheskikh faktorov [Bullying in the Environment of Senior Graduates of the Russian Federation: The Prevalence and Influence of Socio-Economic Factors]. *Mir psikhologii*, no 1 (97), pp. 165–177.

Reivich K., Shatte A. (2002) *The Resilience Factor: 7 Essential Skills for Overcoming Life's Inevitable Obstacles*. New York: Broadway Books.

Richards A., Rivers I., Akhurst J. (2008) A Positive Psychology Approach to Tackling Bullying in Secondary Schools: A Comparative Evaluation. *Educational and Child Psychology*, vol. 25, no 2, pp. 72–81.

Seligman M. E. (2012) *Flourish: A Visionary New Understanding of Happiness and Well-Being*. New York; Toronto: Free Press.

Seligman M. E. (2002) Positive Psychology, Positive Prevention, and Positive Therapy. *Handbook of Positive Psychology* (eds C. R. Snyder, S. J. Lopez), New York, NY: Oxford University, pp. 3–7.

Seligman M. E., Steen T. A., Park N., Peterson C. (2005) Positive Psychology Progress: Empirical Validation of Interventions. *American Psychologist*, vol. 60, no 5, pp. 410–421.

Seligman M., Ernst R., Gillham J., Reivich K., Linkin M. (2009) Positive Education: Positive Psychology and Classroom Interventions. *Oxford Review of Education*, vol. 35, no 3, pp. 293–311.

Sin N., Lyubomirsky S. (2009) Enhancing Well-Being and Alleviating Depressive Symptoms with Positive Psychology Interventions: A Practice-Friendly Meta-Analysis. *Journal of Clinical Psychology*, vol. 65, no 5, pp. 467–487.

Slee P. (1995) Bullying in the Playground: The Impact of Inter-Personal Violence on Australian Children's Perceptions of Their Play Environment. *Children's Environments*, vol. 12, no 3, pp. 320–327.

Slee P.T., Skrzypiec G. (2016) *Well-Being, Positive Peer Relations and Bullying in School Settings*. Dordrecht: Springer.

Soldatova G., Rasskazova E. (2014) Psikhologicheskie modeli tsifrovoj kompetentnosti rossijskikh podrostkov i roditelej [Psychological Models of Digital Competence in Russian Adolescents and Parents]. *Natsionalny Psikhologichesky Zhurnal/National Psychological Journal*, vol. 2, no 14, pp. 25–31. DOI:10.11621/npj.2014.0204.

Soldatova G., Zotova E., Lebesheva M., Shlyapnikov V. (2013) *Internet: vozmozhnosti, kompetentsii, bezopasnost. Metodicheskoe posobie dlya rabotnikov sistemy obshchego obrazovaniya.* [The Internet: Opportunities, Competencies, Safety. Methodological Guide for Employees of the General Education System], part I "Lectures". Moscow: Gutenberg. https://www.ifap.ru/library/book548.pdf

Suldo S. M., Hearon B. V., Bander B. et al. (2015) Increasing Elementary School Students' Subjective Well-Being through a Classwide Positive Psychology Intervention: Results of a Pilot Study. *Contemporary School Psychology*, vol. 19, no 4, pp. 300–311.

Tani F., Greenman P. S., Schneider B. H., Fregoso M. (2003) Bullying and the Big Five: A Study of Childhood Personality and Participant Roles in Bullying Incidents. *School Psychology International*, vol. 24, no 2, pp. 131–146.

Tippett N., Wolke D. (2015) Aggression between Siblings: Associations with the Home Environment and Peer Bullying. *Aggressive Behavior*, vol. 41, no 1, pp. 14–24.

Ttofi M. M., Farrington D. P. (2011) Effectiveness of School-Based Programs to Reduce Bullying: A Systematic and Meta-Analytic Review. *Journal of Experimental Criminology*, vol. 7, no 1, pp. 27–56.

Underwood M. K. (2003) *Social Aggression among Girls*. New York; London: Guilford.

Varjas K., Meyers J., Meyers B., Kim S., Henrich C. C., Tenebaum L. S. (2009) Positive Psychology and the Prevention of School-Based Victimization. *Handbook of Positive Psychology in Schools* (eds R. Gilman, E. S. Huebner., M. J. Furlong), New York: Routledge, pp. 323–338.

Waters L. (2011) A Review of School-Based Positive Psychology Interventions. *Australian Journal of Educational and Developmental Psychology*, vol. 28, no 2, art. no 75. DOI:10.1375/aedp.28.2.75.

Behavioral and Motivational Patterns of Internet Users: A Logico-Categorical Analysis

Review of International Studies

I. Pogozhina, A. Podolsky, O. Idobaeva, T. Podolskaya

Received in April 2020

Irina Pogozhina
Doctor of Sciences in Psychology, Associate Professor, Department of Psychology of Education and Pedagogics, Faculty of Psychology, Lomonosov Moscow State University. Address: 11 Mokhovaya St, 125009 Moscow, Russian Federation. Email: pogozhina@mail.ru
Andrey Podolsky
Doctor of Sciences in Psychology, Professor Emeritus of Lomonosov Moscow State University. Address: 11 Mokhovaya St, 125009 Moscow, Russian Federation. Email: apodolskij@mail.ru
Olga Idobaeva
Doctor of Sciences in Psychology, Associate Professor, Chief Expert, National Intellectual Development Foundation. Address: Bld. 1, 27 Lomonosovsky Ave, 119991 Moscow, Russian Federation. Email: oai@list.ru
Tatyana Podolskaya
Doctor of Sciences in Psychology, Professor, Chief Researcher, Institute for Childhood, Family and Education Studies, Russian Academy of Education. Address: 5/16 Makarenko St, 105062 Moscow, Russian Federation. Email: tpodolskaya@list.ru

Abstract. The ongoing digitalization is giving rise to new sciences, such as psychoinformatics which studies the links between digital footprints and individual psychological characteristics. According to top-level researchers, the most important problems to be solved in the nearest future are to understand how new forms of self-perception, -reflection, and -presentation affect social communication; find strategies to foster flow experiences (states in which humans are totally absorbed into the task at hand) in times of a fragmented life style; investigate how the interaction with digital worlds shapes human brains and how we can hinder detrimental effects on the human brain; design digital worlds according to our emotional evolutionary heritage to foster well-being in digital societies; and find meaningful rules for social communication in times of abundant available access to digital distractors.

Internet use behaviors can be prosocial or antisocial, depending on the extent to which the existing social norms are accepted or rejected. Users engaging in the two types of Internet behavior differ in their online communication strategies and manifest specific cognitive, motivational and emotional characteristics.

The goal of this study was to review international findings in order to identify and analyze the logico-categorical characteristics of online antisocial behavior associated with specific motivational patterns of Internet users.

As a result, internal and external determinants of online antisocial behavior have been identified. Significant correlations have been found between pathologic Internet use and user's communicative, emotional, motivational, and cognitive psychological characteristics. A promising direction, in terms of con-

Translated from Russian by I. Zhuchkova.

structing Internet behavior models and designing initiatives to tackle online antisocial behavior, may consist in exploring the links between users' behavior on websites of different purpose and content with their individual psychological characteristics.

Keywords: Internet behavior, Internet use, antisocial behavior, web content, motivation, Internet addiction, self-harm, radicalization.

DOI: 10.17323/1814-9545-2020-3-60-94

Today, we are witnessing a unique process, the inception and structural evolution of a digital environment. Elements of the social environment have gone a long evolutionary way, arranging themselves into social institutions and stable links to which certain rules and regulations apply. Abundant research has been done on the emergence, development and functioning of various types of human behavior in the conventional social environment. The digital environment, however, is only in its nascent stage of development, and little is known yet about the influence of its elements on human behavior and psychological well-being.

Digitalization presents new challenges not only to psychologists and educators but also to scholars studying all kinds of aspects of life. New research disciplines emerge, such as psychoinformatics, which studies the links between digital footprints of Internet users and their psychological characteristics. It turns out that classic psychological methods are able only in part to analyze data derived from digital technologies. As a consequence, psychologists must enrich their scientific methods through the inclusion of methods from informatics [Montag, Duke, Markowetz 2016].

The Digital environment opens up new opportunities for assessing human behavior through the application of psychological targeting. This form of assessment makes it possible to influence the behavior of large groups of people by tailoring digital data to the psychological needs of the target audiences [Matz et al. 2017].

Researchers identify the following most important research avenues to be tackled in the near future [Montag, Diefenbach 2018]:

- Understand how new forms of self-perception, -reflection, and -presentation affect social communication;
- Find strategies to foster flow experiences (states in which humans are totally absorbed into the task at hand) in times of a fragmented life style;
- Investigate how the interaction with digital worlds shapes human brains and how we can hinder detrimental effects on the human brain;
- Design digital worlds according to our emotional evolutionary heritage to foster well-being in digital societies;

Table 1. **Internet use behavior characteristics**

Characteristic	Pattern	
	Prosocial	Antisocial
Communication	No psychological pressure = acceptance and support from others	Psychological pressure in online communication (bullying, etc.)
Cognition	Seeking and providing reliable information	Providing unreliable information (deceit, misinterpretation of information, etc.)
Motivation	Focus on maintaining a healthy lifestyle	Addictions; self-harm and/or incitement to self-harm
	Focus on socially approved activities (charity, volunteering, etc.)	Recruitment to antisocial and/or criminal organizations (e. g. religious cults, AUE, etc.)
Emotion	Neutral or positive connotations of the content consumed and/or distributed	Negative connotations of the content consumed and/or distributed (aggressive, depressive, etc.)

- Find meaningful rules for social communication in times of abundant available access to digital distractors.

To coordinate the efforts of different research teams in solving the problems set forth above and to allow for comparability of research findings obtained by different authors in the same field, conceptual clarity should be provided in describing the characteristics, structures, types and correlations of Internet use behavior. At present, the same terminology is applied to describe phenomena that differ in their sets of parameters, which inhibits the development of unified diagnostic criteria and reduces the congruence of research findings as well as their prognostic value [Griffiths 2015; Lee et al. 2018; Mihajlov, Vejmelka 2017; Nadhirah et al. 2018; Pedro Anderson Ferreira Quirino et al. 2019; Poli 2017].

The goal of this study was to review international findings in order to identify and compare the logico-categorical characteristics of online antisocial behavior associated with specific motivational patterns of Internet users.

1. Internet Behaviors

Conceptually, engagement with Internet content is an externally observable human activity, or behavior, in the digital environment.

Internet behaviors can be prosocial or antisocial, depending on whether the existing social norms are accepted or rejected by the user. Both patterns of Internet behavior have a number of character-

istics associated with online communication strategies of Internet users and their individual psychological differences of cognitive, motivational and emotional nature (Table 1).

The literature analyzed in this study contains no mention of the term "Internet behavior" as a set of characteristics that would describe Internet user behavior as a coherent system of actions associated with individual communicative, cognitive, motivational and emotional patterns. However, certain characteristics of Internet behavior have been explored intensely, first of all those of antisocial Internet behavior. Below, we discuss the available findings from research on the aspects of antisocial Internet behavior associated with individual motivational traits of Internet users.

2. Aspects of Antisocial Internet Behavior Associated with Motivation-Related Psychological Characteristics

Antisocial Internet behaviors associated with motivation-related psychological characteristics include Internet addictions, self-harm or incitement to self-harm, recruitment to antisocial or criminal organizations (such as religious cults, AUE, etc.), etc.[1]

2.1. Internet Addiction

2.1.1. Definition Problems

Internet addiction (IA) as a phenomenon has been explored extensively since the 1990s. It is generally understood as the inability of users to reduce the duration and/or frequency of their Internet activities, which results in such negative consequences as impact on job and educational performance, financial debt, problems in family and interpersonal relationships, etc. [Ching et al. 2017; Laconi, Rodgers, Chabrol 2014]. Psychologists and educators are concerned about the possible negative effects of pathological Internet use on physical condition and mental health of users [Mihajlov, Vejmelka 2017; Odaci, Celik 2016].

Today, researchers around the world still rely on different criteria in defining the concept of Internet addiction and use different terms to describe it, including Internet Addiction (IA), Internet Use Disorder (IUD), Pathological Internet Use (PIU), Problem Internet Use (PIU), etc.—and, subsequently, different diagnostic tools, such as Young's Internet Addiction Test (IAT), Chen's Internet Addiction Scale (CIAS), Davis's Online Cognition Scale (OCS), Günüç's Internet Addiction Scale, Generalized Problematic Internet Use Scale (GPIUS), Compulsive Internet Use Scale (CIUS), and others. This lack of conceptual clarity hinders comparability of the results obtained by different research teams, as they use different diagnostic criteria for Internet addiction. Conceptual ambiguity inhibits quantitative measurements, classification and construction of models to describe the emergence and development of Internet dependencies [Griffiths 2015; Pedro An-

[1] In this article, we focus on addictive behaviors. Similar extensive analysis of self-harm or incitement to self-harm as well as recruitment to antisocial or criminal organizations will be carried out in subsequent publications.

derson Ferreira Quirino et al. 2019; Poli 2017]. This inference is substantiated by the research findings presented further in this article.

2.1.2. Internet Addiction: Classifications and Diagnostic Challenges

Findings show that Internet users exhibit different behaviors depending on the type of content consumed (digital gaming, video gaming, social networking, etc.), which spurs debate in academia on whether specific behavioral patterns should be classified as Internet addiction.

Online gaming is one of the most popular forms of entertainment among young people today, as it is available anytime from any device [Xu, Chen, Adelman 2015].

The 11th Revision of the International Classification of Diseases (ICD-11) by the World Health Organization classifies gaming behavior under the subgroup of mental disorders *6C51 Gaming Disorder*, in particular *6C51.0 Gaming Disorder, Predominantly Online*, and provides three manifestation criteria for diagnosing digital or video gaming as a mental disorder [World Health Organization 2019].

The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) by the American Psychiatric Association defines Internet gaming disorder as addiction to gaming and uses nine diagnostic criteria [American Psychiatric Association 2013; Griffiths 2015; Parekh 2018].

Table 2 provides a summary and comparison of the diagnostic criteria for Internet gaming disorder between the two classifications.

As can be seen from Table 2, some diagnostic criteria for Internet gaming disorder are relatively congruent between ICD-11 ad DSM-5, namely control over gaming (criteria 1 in ICD-11 and 4 in DSM-5), priority of gaming in the hierarchy of motivations (criteria 2 in ICD-11 and 1, 3, 5 in DSM-5), ignoring the negative consequences of gaming (criteria 3 in ICD-11 and 6, 9 in DSM-5). Some criteria contained in DSM-5 (2, 7, 8) are not found in ICD-11. These differences need to be taken into account when developing and validating diagnostic tools and interpreting the results in psychological research.

In the debate on criteria of categorizing different types of behavior as Internet addiction, some authors emphasize that the term "addiction" should only be applied to Internet gaming behavior, in the way that is it described in ICD-11 or DSM-5. Other scholars consider the medium of the Internet to be the main platform that unites different addictive Internet activities [Griffiths 2015; Young 2015]. The Internet is just a way through which people may access to whatever they want—not only gaming but also chatting, shopping, viewing sexually explicit material, etc. Therefore, users might be not addicted to the Internet itself but to some content or services that the Internet provides, which is not limited to games [Kim, Kim 2010; Pontes, Griffiths 2014; 2015].

A study examining the interrelationship and the overlap between problematic Internet use and problematic online gaming in adolescents (2,000 participants) revealed notable differences between the two. Data showed that problematic Internet use was positively associ-

Table 2. **Comparing the diagnostic criteria for Internet gaming disorder**

Classification	ICD-11	DSM-5
Name of disorder	6C51.0 Gaming Disorder, Predominantly Online (https://icd.who.int/browse11/l-m/en#/http%3a%2f%2fid.who.int%2ficd%2fentity%2f338347362)	Internet Gaming Disorder
Diagnostic criteria	1) Impaired control over gaming (e. g. onset, frequency, intensity, duration, termination, context); 2) Increasing priority given to gaming to the extent that gaming takes precedence over other life interests and daily activities; and 3) Continuation or escalation of gaming despite the occurrence of negative consequences	1) Preoccupation with gaming; 2) Withdrawal symptoms when gaming is taken away or not possible (sadness, anxiety, irritability); 3) Tolerance, the need to spend more time gaming to satisfy the urge; 4) Inability to reduce playing, unsuccessful attempts to quit gaming; 5) Giving up other activities, loss of interest in previously enjoyed activities due to gaming; 6) Continuing to game despite problems; 7) Deceiving family members or others about the amount of time spent on gaming; 8) The use of gaming to relieve negative moods, such as guilt or hopelessness; and 9) Risk, having jeopardized or lost a job or relationship due to gaming
Diagnosis assignment requirements	• All manifestations are continuous or recurrent over a period of at least 12 months; • The required duration may be shortened if all diagnostic requirements are met and symptoms are of sufficient severity to result in significant impairment in personal, family, social, educational, occupational or other important areas of functioning	• Experiencing five or more of these symptoms within a year. The condition can include gaming on the Internet, or on any electronic device

ated with online gaming, online chatting and social networking, while problematic online gaming was only associated with online gaming, and also much more strongly associated with being male [Király et al. 2014].

Since problematic Internet use and problematic online gaming are not conceptually identical, it has been proposed to distinguish between generalized and specific Internet addiction [Montag, Bey, Sha et al. 2015]. Researchers must unite and start using the same assessment measures in diagnosing specific disorders, otherwise no conceptual clarity can be achieved regarding different types of Internet addiction [Griffiths 2015].

2.1.3. Challenges in Building Determination Models

Models describing the emergence and development of Internet addiction are based on determining a system of external and internal factors associated with specific patterns of dependency. This avenue of research lacks clarity, too.

2.1.3.1. External Factors of Internet Addiction

Researchers identify the following external factors associated with Internet addiction:

- Accessibility of the Internet, quality of Internet connection, type of device [Dwyer, Kushlev, Dunn 2018; Ergun-Basak, Aydin 2019; Kushlev, Dunn 2019; Singh et al. 2018];
- Educational attainment and field of study [Chaudhari et al. 2015; Ching et al. 2017; Younes et al. 2016; Zhang et al. 2018];
- Sociocultural environment, economic indicators and other country-specific characteristics [Campelo et al. 2018];
- Parental guidance, peer influence [Nadhirah et al. 2018], and other groups of factors.
- Various statistical indicators have been assessed as possible predictors of Internet addiction, such as the number of Internet users, smartphones and other digital devices in a country, the amount of time spent online, the number of online social contacts and types of online activities, accessibility of the Internet, etc.

The population of Internet users has been growing consistently and even explosively in some countries, such as India with its over 600 million Internet users, which is ranked only behind China (854 mln) [Statista Research Department 2020; Internet World Stats 2020; Kumar et al. 2019]. While at home, millennials are more likely to spend time online than with their parents or other family members [Anderson, Steen, Stavropoulos 2017; Malaysian Communications and Multimedia Commission 2017].

The time spent by minors on the Internet has been surging, sometimes reaching 39 hours per week [Nadhirah et al. 2018].

Most young people are involved in social networking[2] [Concepts Technologies 2017; Memon et al. 2018], using the Internet for academic or business purposes much less often [Mahamid, Bert 2018a; 2018b]. The prevalence of daily online activities is distributed from highest to lowest as follows: instant messenger (~91%) social networking (~65%), leisure, without purpose, emails, downloads, forums, blogging, shopping, listening to radio and gaming [Singh et al. 2018]. The rates differ somewhat across countries, but the general trends are persistent.

[2] Napoleoncat. Facebook users in State of Palestine, 2019. https://napoleoncat.com/stats/facebook-users-in-state_of_palestine/2019/07

External factors of Internet addiction may include easy access to the Internet from a variety of devices, diversity of locations providing Internet access, quality of Internet connection, etc. The most frequent Internet users are high school and college students aged between 16 and 24, who are at the critical stage of their social and emotional development. The majority of them possess personal computers and smartphones and can access the Internet from their classrooms and/or places of residence. Going online is largely convenient and free at that age, which increases the risk of developing an addiction [Chiu 2014; Concepts Technologies 2017; Nadhirah et al. 2018; Pesigan, Shu 2016]. Students who are addictive Internet users were found to show significantly higher Internet use in classrooms or campuses, higher use of emails, social networking, blogging, forums, leisure, surfing without purpose, shopping, downloading and higher cyber risk [Ergun-Basak, Aydin 2019; Singh et al. 2018].

Data on problematic Internet use in similar user groups (comparable by age, gender, educational attainment, field of study, country, etc.) is often inconsistent across studies (Table 3).

As shown in Table 3, some authors differ in their definition of Internet addiction, applying the term to high levels of dependency only. Diagnostic criteria are inconsistent across the studies: using the same assessment methods, some researchers classify respondents with a score of 46 to 60 as addictive Internet users ("high level") [Nadhirah et al. 2018], while others diagnose Internet addiction ("excessive user", "severe addiction") at the level of 80 to 100 scores [Kumar et al. 2019; Chaudhari et al. 2015; Zafari, Rafiemanesh, Balouchi 2018]. However, there is also an approach where Internet addiction is defined as a cumulative of all levels (high, medium, mild) except low (regular online users). The cutoff score differs across the studies even here though, suggestions including 49 [Singh et al. 2018], 43 [Ching et al. 2017; Younes et al. 2016] and 31 [Pedro Anderson Ferreira Quirino et al. 2019]. Respondents who score below the cutoff score are considered to be regular online users. Table 3 also displays incoherencies in Internet use data obtained for equivalent or similar samples within one country, across the countries, using different methods, etc.

Differences in definitions, diagnostic criteria and cutoff values make it challenging to compare empirical findings and analyze the influence of such external factors of Internet addiction as gender, age, educational attainment, field of study and socioeconomic status.

One of the recent departures in the Internet addiction field is dedicated to finding similarities and differences between Internet use disorder and smartphone use disorder.

A lot of researchers consider smartphone to be a critical factor of fast-tracking the design of digital worlds [Montag, Diefenbach 2018]. As of early 2020, there were 3.2 billion smartphone users in the world. If this trend persists, the number of smartphone users worldwide will reach 3.8 billion by 2021 [Statista Research Department 2020]. Reg-

Table 3. **External factors of Internet addiction** (country, age, gender, field of study, diagnostic tools)

Country	Sample	Diagnostic tools	Distribution of IA (%)	
Medical undergraduates			IA	No IA
India [Chaudhari et al. 2015]	N = 282 Males = 122 Females = 160 Age ~ 19.9	Young's Internet Addiction Test (YIAT)	58.87, of which: H—0 M—7.45 L—51.42	41.13
India [Singh et al. 2018]	N = 122 Age ~ 20.6	YIAT	H—0 M—19.7	80.3
Lebanon [Younes et al. 2016]	N = 600 Males = 182 Females = 418 Age ~ 20.4	YIAT	16.8 Males/females = 23.6/13.9	83.2
Cross-sectional study [Ching et al. 2017]	N = 426 Males = 156 Females = 270 Age ~ 21.6	YIAT	38.55 Males/females = 44.9/32.2	61.45
Malaysia	N = 237 (55.6%)		37.1	62.9
India	N = 31 (7.3%)		22.6	77.4
China	N = 148 (34.7%)		39.9	60.1
Other countries	N = 10 (2.3%)		30.0	70
Cross-sectional study [Zhang 2018]	N = 3,654	YIAT	32.2	
		Chen's Internet Addiction Scale (CIAS)	5.2	
Brazil [Pedro Anderson Ferreira Quirino et al. 2019; Silva et al. 2017]	N = 359 Males = 88 Females = 271 Age ~ 19.5	YIAT	44.28 Males/females = 51.1/48.9	
		Online Cognition Scale	62.9 Males/females = 54.5/65.7	
University undergraduates			IA	No IA
Iran [Zafari, Rafiemanesh, Balouchi 2018]	N = 9,161	YIAT	30.67, of which: H—4.67 M—25.32	69.33
Adolescents (middle and high school students)			IA	No IA
Malaysia (Kota Bharu, Kelantan) [Nadhirah et al. 2018]	N = 422 Males =150 Females = 272 Age = 13–19	YIAT	H—2 M—33 L—64	1
India (Kendriya Vidyalaya, New Delhi) [Kumar et al. 2019]	N = 426 (Grades 11 and 12): Males = 248 Females = 170	YIAT	H—1.41 M—30.28 L—23.94 Males/females = 40.43/31.33	44.37
Turkey (Malatya) [Aydemir 2018]	N = 3,442	Günüç's Internet Addiction Scale [Günüç 2009]	14.1 At-risk group—42.6 Males/females: higher in males	46.3

Notes: ***IA***—Internet addiction; ***IA*** *males/females*—gender distribution of Internet addiction; *H*, *M*, *L*—high, medium and low levels of Internet addiction.

ular users spend about 2.5 hours daily on their smartphones, mostly engaging in social networking [Montag, Błaszkiewicz, Sariyska et al. 2015]. The right amount of smartphone use makes humans more productive [Montag, Walla 2016], while problematic use reduces productivity and concentration [Duke, Montag 2017; Kushlev, Proulx, Dunn 2016], creates the capacity for "absent presence" [Kushlev et al. 2019], has negative effects on social connectedness with children [Kushlev, Dunn 2019] and undermines the quality of interactions with friends and family [Dwyer, Kushlev, Dunn 2018].

Research on the impact of smartphones on cognitive performance is scarce and requires not only considering the amount of time spent on smartphone use but also distinguishing between specific types of smartphone usage—social activities such as text messaging, email and social media use will have different impacts than gaming or browsing the web [Wilmer, Sherman, Chein 2017].

The prevailing trend of the past decade in the research on external factors of Internet use disorder consists in shifting the focus from frequency to content as the main characteristic of Internet addiction and considering both factors in analysis [Lee et al. 2018; Mihajlov, Vejmelka 2017; Nadhirah et al. 2018]. Special emphasis has been placed lately on the risks associated with online content. They include, in descending order of frequency, blocking of mail because of unknown sender/inappropriate content, receiving false information, pretending to be someone else online, sharing the password, etc. The risks are additionally increased by the lack of cyber safety awareness [Singh et al. 2018].

Therefore, comparison of findings on the impact of external factors on Internet addiction is complicated by the lack of conceptual clarity, uniform tools and a uniform diagnostic approach.

2.1.3.2. Internal Factors of Internet Addiction

Internal factors of Internet addiction are psychological characteristics of Internet users. There is empirical evidence confirming that Internet used disorder (IUD) and smartphone use disorder (SUD) are correlated significantly with:

1) Low life satisfaction and lack of empathy [Lachmann, Sindermann, Sariyska et al. 2018];
2) High levels of social anxiety and impulsivity [Peterka-Bonetta et al. 2019];
3) Low self-directedness—lower willpower anchored in the trait of self-directedness may reflect the core of digital additive tendencies [Lachmann et al. 2019];
4) Specific personality traits (the NEO FFI's Big Five: neuroticism, extraversion, openness, agreeableness and conscientiousness). In particular, available findings revealed the following trends:

- Higher IUD/SUD are associated with low conscientiousness and high neuroticism [Peterka-Bonetta et al. 2019];
- Tendencies toward IUD and SUD are associated with high neuroticism and both low conscientiousness and low agreeableness;
- IUD (but not SUD) tendencies are negatively related to extraversion and SUD (but not IUD) tendencies are negatively associated with openness;
- Overall, IUD has stronger correlations with the personality traits of addictive Internet users than SUD [Lachmann et al. 2019].

Studies involving school and college students demonstrate significant correlations between Internet addiction and a number of indicators describing the personality and learning processes of adolescents and young adults, in particular the following:

1) Low level of emotional intelligence [Oskenbay et al. 2015];
2) Excessive amount of time spent online (one of the dependency patterns) and perceived self-efficacy (a significant negative correlation). These findings are critical as low self-efficacy is known to be a risk factor in both symptoms of depression and suicidal ideation in late adolescence [Berte, Mahamid, Affouneh 2019; Yao, Zhong 2014];
3) Low general, social and family-home self-esteem. Social self-esteem is associated with adequate social behavior and has a decisive influence on the ability to control one's Internet use [Aydin, Sari 2011];
4) Increased feelings of loneliness. Online social contacts with friends and family were found to be not an effective alternative for offline social interactions in reducing feelings of loneliness. Furthermore, while an increase in face-to-face contacts could help to reduce symptoms of Internet addiction, this effect may be neutralized by the increase in online social contacts as a result of excessive Internet use. This results in a worrisome vicious cycle between loneliness and Internet addiction [Yao, Zhong 2014]. Reduced frequency of in-person interactions and the growing prevalence of online interactions in adolescents, associated with the feelings of loneliness, are not induced by individual characteristics but represent a specific characteristic of Generation Z [Twenge et al. 2018; Twenge, Martin, Campbell 2018];
5) Low academic performance, insomnia, symptoms of anxiety and depression [Ching et al. 2017; Hunt et al. 2018; Laconi, Rodgers, Chabrol 2014; Maroma, Karega, Oteyo 2019];
6) Personality disorders [Zadra et al. 2016];
7) Burnout among high school students, the connection being stronger in the male group [Tomaszek, Muchacka-Cymerman 2019].

Negative feelings, negation of self-worth, cognitive mistakes (need for approval, inclination to blame, perfectionism) can be predictors of problematic Internet use, especially in males [Ergun-Basak, Aydin 2019].

In a study of addictive young people's perceptions of the Internet, both positive (prosocial) and negative (hyperactivity, emotional, conduct and peer problems) impacts of Internet use were reported by students, yet the overall impact was assessed as negative [Kumar et al. 2019]. Importantly, while representing an Internet addicted user as a person who spends most of their time surfing on the Internet, as well as a person who sleeps less because of their compulsive Internet addiction, adolescents make a distinction between daily uses of the Internet (e. g. seeking information on the Internet) and behaviors associated with Internet addiction. In the examination of attitudes toward Internet addicted users, girls showed higher levels in items referring to compulsive use and decreased functionality, while boys showed higher levels in recommendations relating to self-awareness of dependency and the protection of privacy in the Internet [Τσουβέλας et al. 2015].

Research on the internal factors of Internet addiction yields more consistent results than research on the external ones. The findings available in literature may serve as a basis for designing mental therapy programs to help addictive Internet users, yet they require further reflection and analysis to be included in the models of Internet addiction emergence and development.

2.2. Self-Harm

Self-harm is another type of antisocial Internet behavior, the prevalence of which in the Internet has been alarming parents, psychologists, educators and physicians.

2.2.1. Definition Problems

Self-harm is broadly defined as intentional injuring of one's own body tissue. There is an ongoing debate in literature on defining the phenomenon. Various terms are used, including self-destructive behavior, self-injury, self-harm, self-inflicted violence, self-mutilation, self-aggression, parasuicide, etc. Conceptual ambiguity complicates the study of self-harm and the development of valid and reliable diagnostic tools.

2.2.2. Self-Harm and the Internet

A number of researchers draw parallels between the considerable rise in social media use among adolescents and young adults and the steady increase in the suicide and non-suicidal self-injury (NSSI) in youths.

Some studies report direct associations between greater time spent on online social networking and self-harm behavior and suicidal ideation in vulnerable adolescents [Baker, Lewis 2013; Memon et al. 2018]. Adolescents with a history of NSSI are more active on social media than adolescents with no NSSI history [Memon et al. 2018]. Daily social media use of more than two hours was also independent-

ly associated with poor self-rating of mental health and experiences of high levels of psychological distress and suicidal ideation in Canadian youth [Sampasa-Kanyinga, Lewis 2015].

Analysis of Instagram as a popular social media site among adolescents showed that NSSI content is very popular on Instagram, being often veiled by ambiguous hashtags [Moreno et al. 2016].

Social networking websites are utilized by self-harming youth not only as a medium to communicate with and to seek social support from other users but also as a source of negative content associated with promotion and exposure of self-harm [Brown et al. 2018; Memon et al. 2018]. Adolescents explicitly report a desire to post negative thoughts ("stressed posting") in social media as a way for emotional release or "call for help" and to seek social support from other users [Radovic et al. 2017]. There is evidence for a direct correlation between frequency of exposure to NSSI and engagement in NSSI among adolescents [Zhu et al. 2016].

The vast majority (93.1%) of NSSI pictures posted by adolescents depict cuts of varying severity (based on 2,826 pictures on Instagram), which accounts for approximately 93% of all pictures that directly depict wounds [Brown et al. 2018]. Analysis of NSSI-related hashtags showed that just over half (54%) of the images did not explicitly represent the act of self-harm. The images that did portray self-harm predominantly displayed self-injury (29%), nearly all cutting. Other forms of self-harm included eating disorders, bruising, scratching and substance use. A third of posts contained no representation of a human form at all. Where people were represented there was a much higher proportion of females than males (33% of all images compared with 9.5% males) [Shanahan, Brennan, House 2019].

Research findings on Internet behaviors of users with a history of self-harm, the content consumed by them and their ways of digital maneuvering may be used in designing digital targeting programs to assist users with such behavior disorders.

2.3. Recruitment to Antisocial Organizations

The use of the Internet to promote radicalization of users and recruit adolescents and young adults into antisocial organizations has been a legitimate public concern. Studies show that most adolescents have been exposed to online hate material, and about one fourth of the respondents have been victimized by such material [Costello et al. 2016; Oksanen et al. 2014].

2.3.1. External Factors of Radicalization

The recent years have seen an increase in studies exploring the relationship between Internet content and radicalism/extremism in adolescents. Such studies are designed to develop means of identifying radical Internet users (social media, forums, etc.) and ways of protecting users from the harmful influence of such content by detecting and blocking it. The following is analyzed:

- Part-of-speech tagging; volume, severity and duration of negative posts [Scrivens, Davies, Frank 2018];
- Images, streaming of violent online viral videos, glamorization of extremism in photo and video materials, hashtags, retweets and likes [Awan 2017];
- Content of posts in Twitter and other online social networks [Goodboy, Martin 2015; Klausen 2015].

Negative content is utilized by extremist users not only passively in the form of viral distribution but also actively during personal online interactions for the purpose of cyberbullying and promoting online hate [Goodboy, Martin 2015; Ojeda, Del Rey, Hunter 2019].

One of the negative external factors of radicalization is the situation of youth in the geographic areas of increased risk (such as occupied territories of Palestine), which is fraught with environmental stressors affecting personality development—not only militarization, poverty, lack of employment opportunities and cultural pressures but also few positive social outlets due to the restrictions on movement between communities. In this situation, it is likely that vulnerability to the easily accessible and unrestricted social networks of social media could lead easily to excessive and maladaptive use as an alternative avenue for socialization [Mahamid, Berte 2018a; 2018b].

2.3.2. Internal Factors of Radicalization

There is no consensus in literature over the psychological indicators of radical authors, either. Some researchers suggest that there is no simple typology that best describes radical users online [Scrivens, Davies, Frank 2018].

Others, meanwhile, suggest that radical users have a specific personality profile including the "Dark Triad" traits of Machiavellianism, psychopathy and narcissism, of which psychopathy is the most reliable predictor of cyberbullying [Goodboy, Martin 2015]. Seven key behavior characteristics and motivations have been identified for people engaging with Twitter and Facebook as a means to radicalize and target communities, either through specific pages, videos or comments and posts: (i) *cyber mobs*, personified through negative content retweets to create a mob mentality, (ii) *loners*, who interact with communities through individual posts and comments, (iii) *fantasists*, who blur the lines between reality and fiction to fantasize over radical movements, (iv) *thrill seekers*, who receive adrenaline rush by creating and distributing negative content; (v) *moral crusaders* talking about the moral duty to fight, (vi) *narcissists* who use radical content as a means to whip up a climate of revenge seeking, and (vii) *identity seekers*, who create and disseminate radical content as a means of searching for some form of identity or masculinity [Awan 2017].

A number of studies show that mental disorders may be a factor of youth radicalization, too [Campelo et al. 2018].

Exposure of adolescents to hate material is associated with high online activity, poor attachment to family and physical offline and/or online victimization [Oksanen et al. 2014]. Among young adults, higher levels of education, lower levels of trust in the federal government and proclivity towards risk-taking are associated with increased exposure to negative materials [Costello et al. 2016].

Research in this area is complicated by difficulties with accessing personal profiles of social media users and tracking their moves. The vast majority of data has been obtained for young people detained for or convicted of radicalism, i. e. retrospectively. Therefore, a lot of questions remain unanswered about the socio-psychological environments promoting or preventing radicalization of advantaged youths, and this avenue keeps being thoroughly investigated.

3. Conclusion

A review of international literature allows making the following inferences:

1. Digitalization has both positive and negative effects on physical and mental health at different stages of human life.

New scientific disciplines, such as psychoinformatics, open up new opportunities for assessing human behavior through the application of psychological targeting and influencing the behavior of large groups of people by tailoring digital data to the needs of Internet users.

2. Internet behavior is a new type of human behavior that requires targeted research, identification and analysis of logico-categorical characteristics, and construction of determination models of behavioral pattern emergence and development.

2.1. Considering the risks that the content of digital data may carry for users' mental and physical health, we suggest distinguishing between two types of Internet behavior, prosocial and antisocial. However, they should not be treated as a dichotomy, rather as a continuum between acceptance and rejection of social norms. Analysis of the relationship between digital footprints as externally observable behaviors induced by individual psychological characteristics may serve as a basis for constructing descriptive and determination models for the emergence and development of prosocial and antisocial behavioral patterns. Such models could be further used to design prosocial behavioral patterns to assist Internet users exposed to negative content online in overcoming their mental health problems.

2.2. The international literature analyzed in this study contains no mention of the term "Internet behavior" as a set of characteristics that would describe Internet use behavior as a coherent system of actions associated with individual communicative, cognitive, motivational and emotional patterns. However, certain characteristics of Internet be-

havior have been explored intensely, first of all those of antisocial Internet behavior:

1) Communicative: situations of psychological pressure in online communication (bullying, etc.);
2) Cognitive: providing unreliable information (deceit, misinterpretation of information, etc.)
3) Motivational: addictions, self-harm and/or incitement to self-harm, recruitment to antisocial and/or criminal organizations;
4) Emotional: negative connotations of the content consumed and/or distributed (aggressive, depressive, etc.).

3. The area studied most thoroughly is the patterns of antisocial Internet behavior associated with motivational characteristics of users: Internet addictions, self-harm or incitement to self-harm, recruitment to antisocial or criminal organizations.

4. The Internet addiction field still lacks conceptual clarity, which hinders comparability of the results obtained by different research teams, quantitative measurements, classification and construction of models to describe the emergence and development of Internet dependencies.

4.1. Findings show that Internet users exhibit different behaviors depending on the type of content consumed (digital gaming, video gaming, social networking, etc.). It is proposed to distinguish between generalized and specific Internet addiction and use different assessment measures in diagnosing them.

4.2. The following external factors of addictive Internet use in adolescents and young adults are identified:

- Accessibility of the Internet, quality of Internet connection, type of device;
- Amount of time spent online, number of online social contacts and types of online activities;
- Sociocultural environment, economic indicators and other country-specific characteristics;
- Age, gender, educational attainment and field of study;
- Parental guidance and peer influence;
- Content consumed.

Data on the influence that various groups of factors have on the level of Internet addiction is often inconsistent across similar user samples in different countries, which may be related to the lack of conceptual clarity, uniform tools and a uniform diagnostic approach. This results in a limited comparability of research findings on the impact of external factors on the emergence and development of Internet addiction obtained by different authors within the field.

4.3. There is empirical evidence confirming that Internet use disorder (IUD) and smartphone use disorder (SUD) are correlated significantly with the following internal factors of Internet addiction:

5) Communicative: reduced frequency of in-person interactions and growing prevalence of online interactions associated with increased feelings of loneliness;
6) Emotional: feelings of loneliness, low life satisfaction and lack of empathy, high levels of social anxiety and impulsivity, negative emotions, symptoms of anxiety associated with insomnia, low level of emotional intelligence, burnout;
7) Motivational: low perceived self-efficacy, low willpower, cognitive mistakes (need for approval, inclination to blame, perfectionism);
8) Cognitive: low self-esteem, low self-directedness, low academic performance.

Young people with a propensity to develop Internet and smartphone addictions are characterized by a specific Big Five personality profile: high neuroticism (emotional instability, anxiety, irritability), low conscientiousness and low agreeableness. Levels of introversion and openness show different patterns for Internet use disorder (high introversion) and smartphone use disorder (low openness). Overall, IUD has stronger correlations with the personality traits of addictive Internet users than SUD.

Adolescents report both positive (prosocial) and negative impacts of Internet use on their lives and make a distinction between daily uses of the Internet (e. g. seeking information on the Internet) and behaviors associated with Internet addiction.

5. The Internet is a new accessible medium that allows receiving negative content and information about ways of harming oneself. There is an ongoing debate in literature on defining the phenomenon of self-harm. Conceptual ambiguity complicates the study of self-harm and the development of valid and reliable diagnostic tools. The following has been established:

- Non-suicidal self-injury content is often veiled by ambiguous hashtags;
- NSSI content usually includes pictures depicting cuts of varying severity;
- Adolescents with a history of NSSI are more active on social media, spending more time on them and being more exposed to NSSI content, than adolescents with no NSSI history;
- Social networking websites are utilized by self-harming youth not only as a medium to communicate with and to seek social support from other users but also as a source of negative content associated with promotion and exposure of self-harm.

Research findings on Internet behaviors of users with a history of self-harm, the content consumed by them and their ways of digital maneuvering may be used in designing digital targeting programs to assist users with such behavior disorders.

6. The Internet has been actively used to recruit adolescents and young adults into antisocial organizations. Studies show that most adolescents have been exposed to online hate material, and about one fourth of the respondents have been victimized by such material.

External factors of youth radicalization include the content of materials disseminated online and the social situation of development. The following should be analyzed when designing de-radicalization policies:

- Part-of-speech tagging;
- Volume, duration and severity of negative posts, images, retweets and likes;
- Streaming of violent online viral videos, glamorization of extremism in photo and video materials;
- Social media sentiment (positive/negative) in different regions.

There is no consensus in literature over the psychological characteristics of Internet users as internal factors of radical Internet use or exposure to radicalism. Some researchers hold that people using social media to radicalize youth as well as those more vulnerable to negative content have specific personality profiles. Other, however, suggest that there is no simple typology that best describes radical users online.

Psychological research in this area has a number of objective limitations, such as the impossibility to access personal profiles of social media users directly or track their moves, the restriction of empirical basis to people under investigation or convicted of radicalism, etc.

7. A promising direction, in terms of constructing Internet behavior models and designing initiatives to tackle online antisocial behavior, is to explore the links between users' behavior on websites of different purpose and content with their individual psychological characteristics. Such models will allow identifying the personality profiles of users and at the same time customize digital data to their individual psychological needs, in particular to provide them with mental support.

References

American Psychiatric Association (2013) *Diagnostic and Statistical Manual of Mental Disorders (DSM-5).* Available at: https://www.dhss.delaware.gov/dsamh/files/si2013_dsm5foraddictionsmhandcriminaljustice.pdf (accessed 10 June 2020).

Anderson E. L., Steen E., Stavropoulos V. (2017) Internet Use and Problematic Internet Use: A Systematic Review of Longitudinal Research Trends in Ad-

olescence and Emergent Adulthood. *International Journal of Adolescence and Youth*, vol. 22, no 4, pp. 430–454. https://doi.org/10.1080/02673843.2016.1227716

Awan I. (2017) Cyber-Extremism: Isis and the Power of Social Media. *Society*, vol. 54, no 2, pp. 138–149. https://doi.org/10.1007/s12115–017–0114–0

Aydemir H. (2019) Examining the Internet Addiction Levels of High School Senior Students. *Journal of Education and Training Studies*, vol. 6, no 4, pp. 17–25. http://dx.doi.org/10.11114/jets.v6i4.3084

Aydin B., Sari S. (2011) Internet Addiction among Adolescents: The Role of Self-Esteem. *Procedia—Social and Behavioral Sciences*, vol. 15, no 2, pp. 3500–3505. https://doi.org/10.1016/j.sbspro.2011.04.325.

Baker T. G., Lewis S. *P.* (2013) Responses to Online Photographs of Non-Suicidal Self-Injury: A Thematic Analysis. *Archives of Suicide Research*, vol. 17, no 3, pp. 223–235. https://doi.org/10.1080/13811118.2013.805642

Berte D. Z., Mahamid F. A., Affouneh S. (2019) Internet Addiction and Perceived Self-Efficacy among University Students. *International Journal of Mental Health and Addiction*. Published online. November 18. https://doi.org/10.1007/s11469–019–00160–8.

Brown R., Fischer T., Goldwich A. et al. (2018) #cutting: Non-Suicidal Self-Injury (NSSI) on Instagram. *Psychological Medicine*, vol. 48, no 2, pp. 337–346. https://doi.org/10.1017/S0033291717001751

Campelo N., Oppetit A., Neau F., Cohen D., Bronsard G. (2018) Who Are the European Youths Willing to Engage in Radicalisation? A Multidisciplinary Review of Their Psychological and Social Profiles. *European Psychiatry*, vol. 52, August, pp. 1–14. http://doi.org/10.1016/j.eurpsy.2018.03.001

Chaudhari B., Menon P., Saldanha D. et al. (2015) Internet Addiction and Its Determinants among Medical Students. *Industrial Psychiatry Journal*, vol. 24, no 2, pp. 158–162. http://doi.org/10.4103/0972–6748.181729

Ching S. M., Hamidin A., Vasudevan R. et al. (2017) Prevalence and Factors Associated with Internet Addiction among Medical Students—A Cross-Sectional Study in Malaysia. *Medical Journal of Malaysia*, vol. 72, no 1, pp. 7–11. Available at: https://bit.ly/2BTcUcr (accessed 10 June 2020).

Chiu S. (2014) The Relationship between Life Stress and Smartphone Addiction on Taiwanese University Student: A Mediation Model of Learning Self-Efficacy and Social Self-Efficacy. *Computers in Human Behavior*, vol. 34, no 4, pp. 49–57.

Concepts Technologies (2017) *Digital and Social Media Report in Palestine.* Available at: https://socialstudio.me/wp-content/uploads/2018/04/SMR-P2017EnglishFinal.pdf (accessed 10 June 2020).

Costello M., Hawdon J., Ratliff T., Grantham T. (2016) Who Views Online Extremism? Individual Attributes Leading to Exposure. *Computers in Human Behavior*, vol. 63, October, pp. 311–320. https://doi.org/10.1016/j.chb.2016.05.033

Duke É., Montag C. (2017) Smartphone Addiction, Daily Interruptions and Self-Reported Productivity. *Addictive Behaviors Reports*, vol. 6, July, pp. 90–95. https://doi.org/10.1016/j.abrep.2017.07.002

Dwyer R.J, Kushlev K., Dunn E. W. (2018) Smartphone Use Undermines Enjoyment of Face-to-Face Social Interactions. *Journal of Experimental Social Psychology*, vol. 78, November, pp. 233–239. https://doi.org/10.1016/j.jesp.2017.10.007

Ergun-Basak B., Aydin M. (2019) Problematic Internet Use in Terms of the Purposes of Internet Use, Irrational Beliefs, Feelings of Inferiority, and Gender. *Addicta: The Turkish Journal on Addictions*, vol. 6, no 3, pp. 471–496. http://dx.doi.org/10.15805/addicta.2019.6.3.0017

Goodboy A., Martin M. (2015) The Personality Profile of a Cyberbully: Examining the Dark Triad. *Computers in Human Behaviour*, vol. 49, August, pp. 1–4. https://doi.org/10.1016/j.chb.2015.02.052

Griffiths M. (2015) Problematic Online Gaming: Issues, Debates and Controversies // *Medicinskaâ psihologiâ v Rossii*, vol. 4, no 33, art. no 5. Available at: http://mprj.ru (accessed 10 June 2020).

Gunuc S. (2009) *Development of Internet Addiction Scale and Scrutinising the Relations between the Internet Addiction and Some Demographic Variables*. (Unpublished Master's Thesis) Yüzüncü Yıl University, Institute of Social Sciences, Turkey, Number of Thesis: 234300.

Hunt M. G., Marx R., Lipson C. et al. (2018) No More FOMO: Limiting Social Media Decreases Loneliness and Depression. *Journal of Social and Clinical Psychology*, vol. 37, no 10, pp. 751–768. https://doi.org/10.1521%2Fjscp.2018.37.10.751

Internet World Stats (2020) *Alphabetical List of Countries Including the Latest Internet Indicators, Usage, Penetration, Rates, Population, Size (sq. km.) and ISO 3316 Symbol*. Available at: https://www.internetworldstats.com/list2.htm (accessed 10 June 2020).

Kim M. G., Kim J. (2010) Cross-Validation of Reliability, Convergent and Discriminant Validity for the Problematic Online Game Use Scale. *Computers in Human Behavior*, vol. 26, no 3, pp. 389–398.

Király O., Griffiths M. D., Urbán R. et al. (2014) Problematic Internet Use and Problematic Online Gaming Are Not the Same: Findings from a Large Nationally Representative Adolescent Sample. *Cyberpsychology, Behavior and Social Networking*, vol. 17, no 12, pp. 749–754.

Klausen J. (2015) Tweeting the Jihad: Social Media Networks of Western Foreign Fighters in Syria and Iraq. *Studies in Conflict & Terrorism*, vol. 38, no 1, pp. 1–22. https://doi.org/10.1080/1057610X.2014.974948

Kosinski M., Bachrach Y., Kohli P. et al. (2014) Manifestations of User Personality in Website Choice and Behaviour on Online Social Networks. *Machine Learning*, vol. 95, no 3, pp. 357–380. https://doi.org/10.1007/s10994–013–5415-y

Kumar N., Kumar A., Mahto S. K. et al. (2019) Prevalence of Excessive Internet Use and Its Correlation with Associated Psychopathology in 11th and 12th Grade Students. *General Psychiatry*, vol. 32, iss. 2, art. no e100001. https://doi.org/10.1136/GPSYCH-2018–100001

Kushlev K., Dunn E. *W.* (2019) Smartphones Distract Parents from Cultivating Feelings of Connection when Spending Time with Their Children. *Journal of Social and Personal Relationships*, vol. 36, iss. 6, pp. 1619–1639. https://doi.org/10.1177%2F0265407518769387

Kushlev K., Hunter J. F., Proulx J., Pressman S. D., Dunn E. (2019) Smartphones Reduce Smiles between Strangers. *Computers in Human Behavior*, vol. 91, September, pp. 12–16. https://doi.org/10.1016/j.chb.2018.09.023

Kushlev K., Proulx J., Dunn E. W. (2016) «Silence Your Phones»: Smartphone Notifications Increase Inattention and Hyperactivity Symptoms. Proceedings of the *2016 CHI Conference on Human Factors in Computing Systems (San Jose, May, 2016)*, pp. 1011–1020. https://doi.org/10.1145/2858036.2858359

Lachmann B., Duke É., Sariyska R., Montag C. (2019) Who's Addicted to the Smartphone and/or the Internet? *Psychology of Popular Media Culture*, vol. 8, no 3, pp. 182–189. https://doi.org/10.1037/ppm0000172

Lachmann B., Sindermann C., Sariyska R.Y et al. (2018) The Role of Empathy and Life Satisfaction in Internet and Smartphone Use Disorder. *Frontiers in Psychology*, vol. 9, March, art. no 398. https://doi.org/10.3389/fpsyg.2018.00398

Laconi S., Rodgers R. F., Chabrol H. (2014) The Measurement of Internet Addiction: A Critical Review of Existing Scales and Their Psychometric Properties. *Computers in Human Behavior*, vol. 41, December, pp. 190–202.

Lee H. K., Lee H. W., Han J. H., Park S., Ju S. J., Choi K., Jeon H. J. (2018) Development and Validation Study of the Internet Overuse Screening Questionnaire. *Psychiatry Investigation*, vol. 15, no 4, pp. 361–369.

Mahamid F. A., Berte D. Z. (2018b) Portrayals of Violence and At-Risk Populations: Symptoms of Trauma in Adolescents with High Utilization of Social Media. *International Journal of Mental Health and Addiction*. Published online 15 October. https://doi.org/10.1007/s11469–018–9999–0

Mahamid F. A., Berte D. Z. (2018a) Social Media Addiction in Geopolitically At-Risk Youth. *International Journal of Mental Health and Addiction*, vol. 17, no 1, pp. 102–111. https://doi.org/10.1007/s11469–017–9870–8

Malaysian Communications and Multimedia Commission (2017*) Internet Users Statistics in Malaysia.* Available at: https://www.mcmc.gov.my/skmmgovmy/media/General/pdf/MCMC–Internet-Users-Survey-2017_v2.pdf (accessed 10 June 2020).

Maroma F., Karega M., Oteyo J. (2019) Relationship between Depression and Pathological Internet Use among University Students. *Cypriot Journal of Educational Sciences*, vol. 14, no 2, pp. 201–207. https://doi.org/10.18844/cjes.v14i2.3123

Matz S. C., Kosinski M., Nave G., Stillwell D. J. (2017) Psychological Targeting as an Effective Approach to Digital Mass Persuasion. *Proceedings of the National Academy of Sciences*, vol. 114, no 48, pp. 12714–12719. https://doi.org/10.1073

Memon A. M., Sharma S. G., Mohite S. S. et al. (2018) The Role of Online Social Networking on Deliberate Self-Harm and Suicidality in Adolescents: A Systematized Review of Literature. *Indian Journal of Psychiatry*, vol. 60, no 4, pp. 384–392. https://doi.org/10.4103/psychiatry.IndianJPsychiatry_414_17

Mihajlov M., Vejmelka L. (2017) Internet Addiction: A Review of the First Twenty Years. *Psychiatria Danubina*, vol. 29, no 3. pp. 260–272. Available at: http://www.psychiatria-danubina.com/UserDocsImages/pdf/dnb_vol29_no3/dnb_vol29_no3_260.pdf (accessed 10 June 2020).

Montag C., Bey K., Sha P. et al. (2015) Is It Meaningful to Distinguish between Generalized and Specific Internet Addiction? Evidence from a Cross-Cultural Study from Germany, Sweden, Taiwan and China. *Asia Pacific Psychiatry*, vol. 7, no 1, pp. 20–26. https://doi.org/10.1111/appy.12122

Montag C., Błaszkiewicz K., Sariyska R. et al. (2015) Smartphone Usage in the 21st Century: Who Is Active on Whatsapp? *BMC Research Notes*, vol. 8, no 1, pp. 331–337. https://doi.org/10.1186/s13104–015–1280-z

Montag C., Diefenbach S. (2018) Towards Homo Digitalis: Important Research Issues for Psychology and the Neurosciences at the Dawn of the Internet of Things and the Digital Society. *Sustainability*, vol. 10, no 2, pp. 415–436. https://doi.org/10.3390/su10020415

Montag C., Duke É., Markowetz A. (2016) Toward Psychoinformatics: Computer Science Meets Psychology. *Computational and Mathematical Methods in Medicine*, vol. 2016, art. ID2983685. https://doi.org/10.1155/2016/2983685

Montag C., Walla P. (2016) Carpe Diem Instead of Losing Your Social Mind: Beyond Digital Addiction and Why We All Suffer from Digital Overuse. *Cogent Psychology*, vol. 3, no 1, art. no 1157281. https://doi.org/10.1080/23311908.2016.1157281

Moreno M. A., Ton A., Selkie E. M., Evans Y. (2016) Secret Society 123: Understanding the Language of Self-Harm on Instagram. *Journal of Adolescent Health*, vol. 58, no 1, pp. 78–84. https://doi.org/10.1016/j.jadohealth.2015.09.015

Nadhirah H., Normala R., Lukman Z. M., Azlini C., Kamal M. *Y.* (2018) Internet Addiction among Secondary School Students in Kota Bharu, Kelantan, Malaysia. *International Journal of Research and Innovation in Social Science*, vol. II, iss. XII, pp. 108–114. Available at: https://www.rsisinternational.org/journals/ijriss/Digital-Library/volume-2-issue-12/108–114.pdf?x49905 (accessed 10 June 2020).

Odaci H., Celik C. (2016) Internet Dependence in an Undergraduate Population: The Roles of Coping with Stress, Self-Efficacy Beliefs, and Sex Role Orientation. *Journal of Educational Computing Research*, vol. 55, no 3, pp. 395–409. https://doi.org/10.1177/0735633116668644.

Ojeda M., Del Rey R., Hunter S. *C.* (2019) Longitudinal Relationships between Sexting and Involvement in Both Bullying and Cyberbullying. *Journal of Adolescence,* vol. 77, June, pp. 81–89. https://doi.org/10.1016/j.adolescence.2019.10.003

Oksanen A., Hawdon J., Holkeri E., Näsi M., Räsänen P. (2014) Exposure to Online Hate among Young Social Media Users. *Soul of Society: A Focus on the Lives of Children & Youth. Sociological Studies of Children and Youth* (ed. M. N. Warehime), Bingley, UK: Emerald Group, vol. 18, pp. 253–273. https://doi.org/10.1108/S1537–466120140000018021

Oskenbay F., Kalymbetova E., Tolegenova A., Kabakova M. P,, Bakiyeva S., Nugmanova S. (2015) Addictive Behavior among Adolescents. *Procedia—Social and Behavioral Sciences*, vol. 171, January, pp. 406–411.

Parekh R. (2018) *Internet Gaming.* Available at: https://www.psychiatry.org/patients-families/internet-gaming (accessed 10 June 2020).

Pedro Anderson Ferreira Quirino, Rubiane Maria Costa Pininga, Mateus Mourato Barros et al. (2019) Comparison of the Prevalence of Addiction Internet in Brazilian University Students: Online Cognition Scale versus Internet Addiction Test. *Open Journal of Depression and Anxiety*, vol. 1, November, pp. 9–19. https://doi.org/10.36811/ojda.2019.110003

Pesigan I., Shu U. (2016) Cognitive and Psychosocial Health Risk Factors of Social Networking Addiction. *International Journal of Mental Health and Addiction*, vol. 14, no 4, pp. 550–564. https://doi.org/10.1007/s11469–015–9612–8.

Peterka-Bonetta J., Sindermann C., Elhai J. D., Montag C. (2019) Personality Associations with Smartphone and Internet Use Disorder: A Comparison Study Including Links to Impulsivity and Social Anxiety. *Frontiers Public Health*, vol. 7, June, art. no 127. https://doi.org/10.3389/fpubh.2019.00127

Poli R. (2017) Internet Addiction Update: Diagnostic Criteria, Assessment and Prevalence. *Neuropsychiatry*, vol. 7, no 1, pp. 4–8. Available at: http://www.jneuropsychiatry.org/peer-review/internet-addiction-update-diagnostic-criteria-assessment-and-prevalence.pdf (accessed 10 June 2020).

Pontes H., Griffiths M. D. (2015) Measuring DSM-5 Internet Gaming Disorder: Development and Validation of a Short Psychometric Scale. *Computers in Human Behavior*, vol. 45, December, pp. 137–143.

Pontes H., Griffiths M. D. (2014) The Assessment of Internet Gaming Disorder in Clinical Research. *Clinical Research and Regulatory Affairs*, vol. 31, no 2–4, pp. 35–48.

Radovic A., Gmelin T., Stein B. D. et al. (2017) Depressed Adolescents' Positive and Negative Use of Social Media. *Journal of Adolescence*, vol. 55, February, pp. 5–15. https://doi.org/10.1016/j.adolescence.2016.12.002

Sampasa-Kanyinga H., Lewis R. F. (2015) Frequent Use of Social Networking Sites is Associated with Poor Psychological Functioning among Children and Adolescents. *Cyberpsychology, Behavior, and Social Networking*, vol. 18, no 7, pp. 380–385. http://doi.org/10.1089/cyber.2015.0055

Scrivens R., Davies G., Frank R. (2018) Searching for Signs of Extremism on the Web: An Introduction to Sentiment-Based Identification of Radical Au-

thors. *Behavioral Sciences of Terrorism and Political Aggression*, vol. 10, no 1, pp. 39–59. https://doi.org/10.1080/19434472.2016.1276612

Shanahan N., Brennan C., House A. (2019) Self-Harm and Social Media: Thematic Analysis of Images Posted on Three Social Media Sites. *BMJ Open*, vol. 9, no 2, art. no e027006. http://dx.doi.org/10.1136/bmjopen-2018–027006

Silva H. R.S, Areco K. C.N, Bandiera-Paiva P. et al. (2017) Reliability and Construct Validity of the Online Cognition Scale in the Portuguese (Brazil) Version (OCS-BR). *Jornal Brasileiro de Psiquiatria*, vol. 66, no 1, pp. 19–28. https://dx.doi.org/10.1590/0047–2085000000146

Singh G., Pasricha S., Nanda G. et al. (2018) Internet Use Behavior, Risk Profile and 'Problematic Internet Use' among Undergraduate Medical Students: An Epidemiological Study. *International Journal of Community Medicine and Public Health*, vol. 5, no 2, pp. 532–537. http://dx.doi.org/10.18203/2394–6040.ijcmph20180115

Statista Research Department (2020) *Internet Usage in India—Statistics & Facts*. Available at: https://www.statista.com/topics/2157/internet-usage-in-india/ (accessed 10 June 2020).

Statista Research Department (2020) *Number of Smartphone Users Worldwide from 2016 to 2021.* Available at: https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/ (accessed 10 June 2020).

Tomaszek K., Muchacka-Cymerman A. (2019) Sex Differences in the Relationship between Student School Burnout and Problematic Internet Use among Adolescents. *Internet Journal of Environmental Research and Public Health*, vol. 16, no 21, art. no 4107. https://doi.org/10.3390/ijerph16214107

Twenge J. M., Joiner T. E., Rogers M. *L.* et al. (2018) Increases in Depressive Symptoms, Suicide-Related Outcomes, and Suicide Rates among U. S. Adolescents after 2010 and Links to Increased New Media Screen Time. *Clinical Psychological Science*, vol. 6, no 1, pp. 3–17. https://doi.org/10.1177/2167702617723376

Twenge J. M., Martin G. N., Campbell W. K. (2018) Decreases in Psychological Well-Being among American Adolescents after 2012 and Links to Screen Time during the Rise of Smartphone Technology. *Emotion*, vol. 18, no 6, pp. 765–780. https://doi.org/10.1037/emo0000403

Τσουβέλας Γ., Παρασκευοπούλου Π., Κατέρη Ε., Βιταλάκη Έ., Γιωτάκος Ο. (2015) Στάσεις εφήβων για το διαδικτυακό εθισμό [Tsouvelas G., Paraskevopoulou P., Kateri E., Vitalaki E., Giotakos O. Adolescents' Attitudes toward Internet Addiction] // *Επιστημεσ Αγωγησ/Education Sciences*, no 2, pp. 64–75.

Wilmer H.H, Sherman L.E, Chein J. M. (2017) Smartphones and Cognition: A Review of Research Exploring the Links between Mobile Technology Habits and Cognitive Functioning. *Frontiers in Psychology*, vol. 25, April, art. no 605. https://doi.org/10.3389/fpsyg.2017.00605

World Health Organization (2019) *ICD-11 for Mortality and Morbidity Statistics (ICD-11 MMS) (Version: 04/2019)*. Available at: https://icd.who.int/browse11/l-m/en (accessed 10 June 2020).

Xu C. S., Chen J. S., Adelman R. A. (2015) Video Game Use in the Treatment of Amblyopia: Weighing the Risks of Addiction. *The Yale journal of Biology and Medicine*, vol. 88, no 3, pp. 309–317.

Yao M. Z., Zhong Z. (2014) Loneliness, Social Contacts and Internet Addiction: A Cross-Lagged Panel Study. *Computers in Human Behavior*, vol. 30, January, pp. 164–170. https://doi.org/10.1016/j.chb.2013.08.007.

Younes F., Halawi G., Jabbour H. et al. (2016) Internet Addiction and Relationships with Insomnia, Anxiety, Depression, Stress and Self-Esteem in University Students: A Cross-Sectional Designed Study. *PLOS ONE*, vol. 11, no 9, art. no e0161126. https://doi.org/10.1371/journal.pone.0161126

Young K. S. (2015) Clinical Aspects of Internet Addiction Disorder. *Medicinskaâ psihologiâ v Rossii*, vol. 4, no 33, art. no 2. Available at: http://mprj.ru (accessed 10 June 2020).

Zadra S., Bischof G., Besser B. et al. (2016) The Association between Internet Addiction and Personality Disorders in a General Population-Based Sample. *Journal of Behavioral Addictions*, vol. 5, no 4, pp. 691–699.

Zafari H., Rafiemanesh H., Balouchi A. (2018) Internet Addiction among Iranian Medical Students: A Systematic Review. *Medical Science*, vol. 22, no 94, pp. 518–524. Available at: https://discoveryjournals.org/medicalscience/current_issue/v22/n94/A3.pdf (accessed 10 June 2020).

Zhang M. W.B., Lim R. B.C., Lee C., Ho R. C.M. (2018) Prevalence of Internet Addiction in Medical Students: A Meta-Analysis. *Academic Psychiatry*, vol. 42, iss. 1, pp. 88–93. https://doi.org/10.1007/s40596–017–0794–1

Zhu L., Westers N. J., Horton S. *E.* et al. (2016) Frequency of Exposure to and Engagement in Nonsuicidal Self-Injury among Inpatient Adolescents. *Archives of Suicide Research*, vol. 20, no 4, pp. 580–590. https://doi.org/10.1080/13811118.2016.1162240

The Role of Trust in the Evolution of College Friendships

Authors

Sofia Dokuka
Candidate of Sciences in Sociology, Associate Professor, Research Fellow at the Institute of Education, National Research University Higher School of Economics.
E-mail: sdokuka@hse.ru

Maria Yudkevich
Candidate of Sciences in Economics, Vice Rector, Director of the Center for Institutional Studies, National Research University Higher School of Economics.
E-mail: yudkevich@hse.ru

Address: 20 Myasnitskaya Str., 101000 Moscow, Russian Federation.

Abstract

The influence of individual characteristics on social structures is a key issue in sociological research. This study examines the evolution of social networks among freshmen at a Russian university to determine the role of generalized trust in social integration. It is demonstrated that trustful individuals are more likely to enter into relationships with people with whom they have no mutual friends and to expand their social networks. Empirical evidence is consistent with the theoretical prediction of sociologists, James S. Colman and Eric M. Uslaner in particular, that interpersonal trust has an impact on the whole social structure, which means it determines how societies function.

Keywords

social networks, generalized trust, trust, social integration, social network dynamics, social network analysis, student networks, higher education.

References

Andrew S. A. (2009) Regional Integration through Contracting Networks: An Empirical Analysis of Institutional Collection Action Framework. *Urban Affairs Review*, vol. 44, no 3, pp. 378–402.

Bamberger W. (2010) *Interpersonal Trust—Attempt of a Definition* (Master Thesis) Munich, Germany: Technical University of Munich.

Ben-Ner A., Putterman L. (2009) Trust, Communication and Contracts: An Experiment. *Journal of Economic Behavior & Organization*, vol. 70, no 1, pp. 106–121.

Beugelsdijk S., de Groot H. L.F., van Schaik A. B.T.M. (2004) Trust and Economic Growth: A Robustness Analysis. *Oxford Economic Papers*, vol. 56, no 1, pp. 118–134.

Bjørnskov C. (2008) Social Trust and Fractionalization: A Possible Reinterpretation. *European Sociological Review*, vol. 24, no 3, pp. 271–283.

Burt R. S. (2004) Structural Holes and Good Ideas. *American Journal of Sociology*, vol. 110, no 2, pp. 349–399.

Coleman J. S. (1986) Social Theory, Social Research, and a Theory of Action. *American Journal of Sociology*, vol. 91, no 6, pp. 1309–1335.

Dirks K. T., Ferrin D. L. (2001) The Role of Trust in Organizational Settings. *Organization Science*, vol. 12, no 4, pp. 450–467.

Dokuka S., Valeeva D., Yudkevich M. (2015) Koevolyutsiya sotsialnykh setey i akademicheskikh dostizheniy studentov [Co-Evolution of Social Networks and Student Performance]. *Voprosy obrazovaniya/Educational Studies Moscow*, no 3, pp. 44–65. DOI:10.17323/1814-9545-2015-3-44-65.

Goddard R. D., Salloum S. J., Berebitsky D. (2009) Trust as a Mediator of the Relationships between Poverty, Racial Composition, and Academic Achie-

vement: Evidence from Michigan's Public Elementary Schools. *Educational Administration Quarterly*, vol. 45, no 2, pp. 292–311.
Hedström P., Bearman P. (2009) *The Oxford Handbook of Analytical Sociology*. Oxford: Oxford University.
Jen M.-H., Sund E. R., Johnston R., Jones K. (2010) Trustful Societies, Trustful Individuals, and Health: An Analysis of Self-Rated Health and Social Trust Using the World Value Survey. *Health & Place*, vol. 16, no 5, pp. 1022–1029.
Kimmel M. J., Pruitt D., Magenau J. M. et al. (1980) Effects of Trust, Aspiration, and Gender on Negotiation Tactics. *Journal of Personality and Social Psychology*, vol. 38, no 1, pp. 9–22.
Knack S., Keefer P. (1997) Does Social Capital Have an Economic Payoff? A Cross-Country Investigation. *The Quarterly Journal of Economics*, vol. 112, no 4, pp. 1251–1288.
Kuroki M. (2011) Does Social Trust Increase Individual Happiness in Japan? *The Japanese Economic Review*, vol. 62, no 4, pp. 444–459.
Merton R. K. (1945) Sociological Theory. *American Journal of Sociology*, vol. 50, no 6, pp. 462–473.
Merton R. K. (1938) Social Structure and Anomie. *American Sociological Review*, vol. 3, no 5, pp. 672–682.
R Development Core Team (2000) *R Language Definition*. Vienna: R Foundation for Statistical Computing.
Read W. H. (1962) Upward Communication in Industrial Hierarchies. *Human Relations*, vol. 15, no 1, pp. 3–15.
Ripley R. M., Snijders T. A.B., Boda Z., Vörös A., Preciado P. (2020) Manual for RSiena. Oxford: University of Oxford. https://www.stats.ox.ac.uk/~snijders/siena/RSiena_Manual.pdf
Rotter J. B. (1971) Generalized Expectancies for Interpersonal Trust. *American Psychologist*, vol. 26, no 5, pp. 443–452.
Schelling T. C. (1971) Dynamic Models of Segregation. *Journal of Mathematical Sociology*, vol. 1, no 2, pp. 143–186.
Snijders T. A.B., Steglich C. E.G., Schweinberger M. (2007) Modeling the Co-Evolution of Networks and Behavior. *Longitudinal Models in the Behavioral and Related Sciences* (eds K. van Montfort, H. Oud, A. Satorra), New York: Lawrence Erlbaum Associates, pp. 41–71.
Snijders T. A., van de Bunt G. G., Steglich C. E. (2010) Introduction to Stochastic Actor-Based Models for Network Dynamics. *Social Networks*, vol. 32, no 1, pp. 44–60.
Subramanian S. V., Kim D. J., Kawachi I. (2002) Social Trust and Self-Rated Health in US Communities: A Multilevel Analysis. *Journal of Urban Health*, vol. 79, no 1, pp. S21–S34.
Uslaner E. M. (2013) Trust as an Alternative to Risk. *Public Choice*, vol. 157, no 3–4, pp. 629–639.
Uslaner E. M. (2002) *The Moral Foundations of Trust*. Cambridge, UK: Cambridge University.

Factors of Attrition among Computer Science and Engineering Undergraduates in Russia

E. Shmeleva, I. Froumin

Received in January 2020

Evgeniia Shmeleva
Research Fellow, Center of Sociology of Higher Education, Institute of Education, National Research University Higher School of Economics. Email: eshmeleva@hse.ru
Isak Froumin
Academic Supervisor, Institute of Education, National Research University Higher School of Economics. Email: ifroumin@hse.ru

Address: 20 Myasnitskaya St, 101000 Moscow, Russian Federation.

Abstract. STEM education has been a priority in present-day Russia, nearly half of all the government-funded places in colleges being provided in STEM majors. At the same time, attrition rates have been the highest in this field. The present study aims to estimate the attrition rates in computer science and engineering education at the beginning of and midway through instruction and to determine the factors associated with college dropouts. Our research uses the results of a survey of over 4,000 computer science and engineering students from 34 Russian colleges, composing a representative national sample, and administrative data on student withdrawal. Vince Tinto's student departure theory is used to analyze the determinants of student attrition during the first three semesters. According to Tinto's theory, social and academic integration are critically important to the retention and success of students in the chosen university. Our findings confirm the key role of academic integration (specifically class attendance and interactions with faculty) in preventing dropouts but refute the hypothesis of social integration significance. Students with low USE scores in mathematics and those mismatched to their major were found to be at higher risk of dropping out. No evidence has been found to prove the hypothesis of dropout rates being higher in more selective institutions. Recommendations for universities for reducing college attrition rates are discussed in the final part of the paper.

Keywords: higher education, college dropout, college attrition, student withdrawal, academic integration, social integration, college institutional characteristics.

DOI: 10.17323/1814-9545-2020-3-110-136

This study was sponsored by the Russian Foundation for Basic Research as part of Research Project no 19-013-00675.
We would like to thank our colleagues from the Center of Sociology of Higher Education (Institute of Education, National Research University Higher School of Economics)—Igor Chirikov, Irina Shcheglova, Elena Gorbunova and Natalia Maloshonok—for their active participation in discussion at different stages of article preparation, their valuable advice and support.

STEM (science, technology, engineering and mathematics) education plays a significant role in national economic growth, being considered as a driver of innovation [Blackie, le Roux, McKenna 2016; Kardanova et al. 2016]. In response to today's global trend of knowledge-based economy [National Academy of Science 2007], the gov-

ernment of Russia has made STEM a priority of higher education development[1]. About a third of all Russian undergraduates are enrolled in STEM programs [Gokhberg, Kovaleva, Kuzminov 2018]; 47% of government-funded places were allocated to STEM majors in the academic year 2018/19[2].

Despite the focus on STEM disciplines and the extensive discussion of relevant issues in academia, the quality of STEM education in Russia could hardly be called satisfactory. STEM majors do not attract many candidates and seem to be largely chosen by low performers—a quarter of applicants have a mean USE[3] score below 56 [Kuzminov, Froumin, Ovcharova 2018][4]. International comparative assessments demonstrate that a minority of Russian undergraduates receives high quality training in elite institutions that allows them to be competitive in the global labor market, while the majority of students receive low quality training in non-elite institutions [Loyalka et al. 2014]. However, even graduates from elite STEM programs of Russia are skilled less than graduates from elite programs of China, India or the United States[5] [Loyalka et al. 2019].

The situation is aggravated by higher attrition rates in STEM majors as compared to non-STEM programs [Kondratjeva, Gorbunova, Hawley 2017].

In particular, the data obtained at two Russian colleges show that attrition in STEM fields (25%) was considerably higher than in non-STEM fields (19%) during 2.5 years after enrollment [Kondratjeva, Gorbunova, Hawley 2017][6]. Researchers suggested that this result could be due to lower selectivity, curriculum difficulty and the lack of academic services for academically struggling students in computer science and engineering departments. However, this hypothesis has not been tested empirically.

As computer science and engineering education in Russia is losing its quality and attractiveness, it is critical to find resources to en-

---

[1] Klimov A. (2013) *Kolichestvo byudzhetnykh mest dlya obucheniya v vuzakh sokhranilos' na urovne 2012 g.* [The Number of Government-Funded Places in Universities Has Remained at the Level of 2012]. Available at: https://минобрнауки.рф/новости/3389

[2] Report of the Government of the Russian Federation to the Federal Assembly of the Russian Federation on Implementing the National Education Policy, 2019: http://static.government.ru/media/files/VGZkuVnp1h5rLAAIBZ1AsP5z-v4zhl79t.pdf

[3] Unified State Exam

[4] These students had "C's in high school mathematics and life sciences" [Kuzminov, Frumin, Ovcharova 2018:22].

[5] The study assessed and compared computer science skills among undergraduates in Russia, China, India and the United States using tests designed specifically to measure computer science competencies.

[6] Differences between STEM and non-STEM fields are statistically significant at the level of $p < 0.05$. Data on attrition was obtained directly from the authors (the significance level was not specified in the publication).

hance the internal efficiency of universities, in particular to understand the reasons behind student attrition. This study makes an advance in that direction, seeking to solve two problems:

1. Measure attrition rates in STEM majors at the beginning of (during the first three semesters) and midway through instruction (between the 3rd and 4th years); and
2. Identify the factors of attrition during the first three semesters.

The study uses the results of a survey of over 4,000 computer science and electronic engineering undergraduates from 34 Russian colleges, composing a representative national sample, and administrative data on student withdrawal provided by the educational institutions.

The theoretical framework of research is based on Vincent Tinto's student departure theory [Tinto 1975; 1993], which postulates that social and academic integration are critically important for successful completion of postsecondary programs.

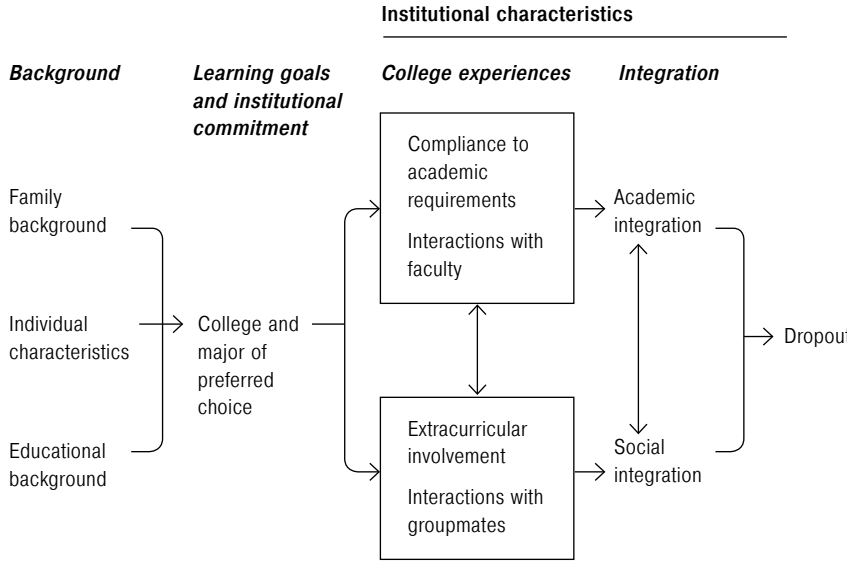
1. Conceptual Framework and Research Hypotheses

College dropouts have been studied globally since the 1970s [Spady 1970; Kamens 1971; Tinto 1975]. Scholars differentiate between system dropouts, when students leave the system of postsecondary education as such without getting a degree, and institutional dropout, when students leave the institution but reserve the possibility of enrolling somewhere else [Mayhew et al. 2016]. In this study, we focus on institutional dropouts.

Exploring the reasons for college dropouts and the factors of successful college completion, researchers use a variety of theoretical frameworks, including an approach highlighting the role of social and academic integration for undergraduate persistence [Tinto 1975; 1993; Spady 1970; Berger 2000], theories that consider certain psychological characteristics, motivation in particular, to be determinants of learning effectiveness [Deci et al. 1991; Bean, Eaton 2001], those that explore the impact of institutional parameters of programs and universities [Bean 1980], etc. Despite the differences in their focus, all the frameworks overlap in that successful completion of college programs is a product of interplay among student characteristics, institutional parameters and students' perceived level of academic integration [Mayhew et al. 2016].

Among all the theories used to analyze college attrition, Tinto's theory of student departure is the most well-reputed and influential [Melguizo 2011]. According to this theory, the likelihood of dropping out is closely related to students' educational background, expectations and levels of social and academic integration, the latter being largely contingent on the institution's retention effort [Tinto 1975; 1993].

Figure 1. **Conceptual framework of research based on Tinto's model** [Tinto, 1993]



Drawing on the conceptual framework of research based on Tinto's model of student departure [Tinto 1993] (Figure 1), we formulate six hypotheses about the factors of institutional attrition. Prior to hypothesizing, we describe the concepts analyzed, present the findings of earlier studies carried out in Russia and beyond, and provide a brief summary of postsecondary education characteristics that matter in the context of our hypotheses.

1.1. Background Characteristics

Variance in the risk of dropping out, according to Tinto's theory, may be explained by students' background, including social background (economic status of family, parental education), individual characteristics (gender, age) and previous educational experiences (e. g. in school) [Tinto 1993]. Empirical evidence has been obtained for Tinto's postulation that social background of students determines to a large extent their college experiences and success. Higher risks of dropping out were observed for students from low socioeconomic backgrounds [Swail 2004; Vignoles, Powdthavee 2009] and those whose parents had no college degree [Pascarella, Terenzini 2005; Brownstein 2014]. The risk is also high for students who performed lower at the secondary stage of education [Timofeeva, Avrunev 2016; Gorbunova 2018]—they find it particularly hard to overcome the gap between the quality of schooling and the college requirements [Terentev, Gruzdev, Gorbunova 2015].

H1: Institutional dropout is more typical of students from lower socio-economic backgrounds.
H2: Institutional dropout is more typical of students who performed lower at the secondary stage of education.

1.2. Institutional Commitment

Students may drop out due to the lack of positive expectations, sense of belonging and attraction to a particular institution. All these characteristics of personal college experience correspond to low levels of institutional commitment [Tinto 1993; Strauss, Volkwein 2004; Gorbunova 2018]. For instance, students whose choice of institution does not match their initial preferences show lower levels of social integration and are more likely to withdraw [Braxton, Milem, Sullivan 2000].

This factor may be especially powerful in the context of Russia, as Russian college students have to choose their specialization at the very start and have very limited opportunities for horizontal mobility—between majors or institutions—later on [Kuzminov, Yudkevich 2007]. Being unsatisfied with their choice of major or college, they have fewer opportunities for a seamless transition as compared to students in education systems where specialization choice occurs at later stages—and thus face a higher risk of dropping out [Braxton, Milem, Sullivan 2000].

H3: Institutional dropout is more typical of students whose choice of institution or major mismatches their initial preferences.

1.3. Academic Integration

Academic integration involves compliance to formal academic requirements of the institution, such as attending classes, completing assignments or getting grades, as well as the quality of in- or out-of-class student–faculty interactions [Tinto 1993].

Studies show that academic performance, reflected in grades, is the main factor of attrition [Pascarella, Terenzini 2005; Mayhew et al. 2016]. Compliance to academic requirements, such as regular class attendance, makes it easier for freshmen to adapt and facilitates social contacts [Bernardo et al. 2016]. Russian studies based on quantitative [Kondratjeva, Gorbunova, Hawley 2017] and qualitative [Gorbunova et al. 2016] data demonstrate that low academic integration is the most probable reason for college dropouts in Russia.

H4: Institutional dropout is more typical of students with low levels of academic integration.

1.4. Social Integration

Students not involved in extracurricular college activities (e. g. student associations) or social contacts with peers have lower levels of social integration and face higher risks of dropping out [Tinto 1993, Mayhew et al. 2016].

Social integration is a serious challenge for most Russian universities, which is proved by the limited choice of extracurricular activi-

ties offered by colleges. As a consequence, students in Russia exhibit low involvement in extracurricular activities [Bekova, Kasharin 2018], which are supposed to be a driver of social integration [Mayhew et al. 2016]. Besides, little is invested in academic support services, such as tutoring, mentoring and other assistance practices. As a result, low-performing students lose their social contacts and connections with time and find themselves at a higher risk of dropping out [Valeeva, Dokuka, Yudkevich 2017]. However, Russian undergraduates study in groups that change little in their composition throughout the whole period of instruction, which may foster closer friendship ties and thus ensure social integration through interactions with groupmates.

H5: Institutional dropout is more typical of students with low levels of social integration.

1.5. Institutional Characteristics

Student attrition may also be associated with institutional characteristics. For example, selectivity (average GPA of students admitted) and student–faculty ratio are considered to be key institutional factors of college dropouts in the United States [Mayhew et al. 2016]. Highly selective and academically demanding Western universities, American for example, were found to show higher timely graduation rates [Alon, Tienda 2005; Gansemer-Topf, Schuh 2006; Melguizo 2008; Sneyers, De Witte 2014]—a finding that appears to be surprising at first glance.

In the United States, low dropout rates are an indicator of effective student retention strategies and high quality instruction, enhancing the institution's attractiveness and competitiveness [Cook, Hartle 2011; Sneyers, De Witte 2014]. In Russia, conversely, low dropout rates are associated with low quality of educational services [Gruzdev, Gorbunova, Froumin 2013].

Russian studies show that attrition rates may be higher in selective universities [Kondratjeva, Gorbunova, Hawley 2017] than in non-selective ones. In elite institutions, the dropout rate reflects the attrition among academically struggling students. Lower dropout rates in non-elite colleges could probably be explained by the higher education funding mechanisms in Russia. Colleges whose funding depends essentially on enrollment—which constitute the vast majority [Sokolov 2017]—may exhibit low selectivity in both admission and retention to maintain the level of funding. In addition, public institutions should not exceed the maximum dropout rate allowed—if enrollment declines by more than 10% during the period of study, the university will be deemed to have failed its government order [Zagirova et al. 2019]. In case the maximum dropout rate allowed is exceeded, the institution will have to pay the funding back to the government and face the risk of state budget cuts in the future.

In the meantime, highly selective universities and institutions that obtain additional sources of funding, e. g. as a result of their research and expert assessment activities, can afford dismissing the poorest

performers who do not cope with the curriculum. Besides, such universities develop a highly demanding environment, high attrition rates being regarded as a distinctive feature thereof. At the same time, however, they can also afford implementing academic support mechanisms to identify and assist students at risk of dropping out, such as remedial courses, tutoring, etc.

H6: Institutional dropout is more typical of students enrolled in highly selective universities.

2. Data

As its empirical basis, this study makes use of the data obtained by the international longitudinal project SUPER-test[7], within the framework of which two cohorts of first-year (2,607 students, Cohort 1) and 3rd-year (2,096 students, Cohort 2) computer science and engineering undergraduates from 34 Russian universities were sampled in the fall semester of 2015 (November–December). Using stratified multistage random sampling, we first sampled universities, then academic departments/schools, and then student groups to ensure data representativeness. During the survey, students provided answers to questions about their college experiences, pre-college educational background, academic and career plans.

The second round of the survey occurred at separate times for the two cohorts (Figures 2 and 3). Ten students in Cohort 1 and 38 students in Cohort 2 were excluded from analysis due to technical impossibility of bringing together data from both rounds[8] and also because one of the student groups in Cohort 2 had graduated by the time the second round took place. The resulting sample was composed of 2,597 undergraduates in Cohort 1 and 2,057 undergraduates in Cohort 2. In the second round of the survey carried out in 2016 (November–December), 72% of Cohort 1 students were in their second year of study. The rest of the first-round respondents had either withdrawn from their initial program (24%) or taken an academic leave[9] (4%). Cohort 2 students were surveyed again in the spring semester 2017 (April–May). By then, 92% of them were in the 4th year, 6% had withdrawn, and 2% were taking a gap year. Among those who

[7] The SUPER-test is an international comparative study aimed at measuring gains in academic, higher order thinking and specific professional skills among computer science and engineering students and identifying factors that affect skill gains. It was organized by researchers at Stanford University in collaboration with partner institutions, in particular universities in Russia, China, and India. For more details on the project, see the Russian website of the project (https://ioe.hse.ru/cshe/supertest/) and [Loyalka et al. 2019].

[8] As a result of errors in respondent ID coding data.

[9] Students at Russian universities are granted with an opportunity to interrupt their studying for usually an academic year in case of health impairment or other serious personal reasons.

Figure 2. **Trajectories of students in Cohort 1**

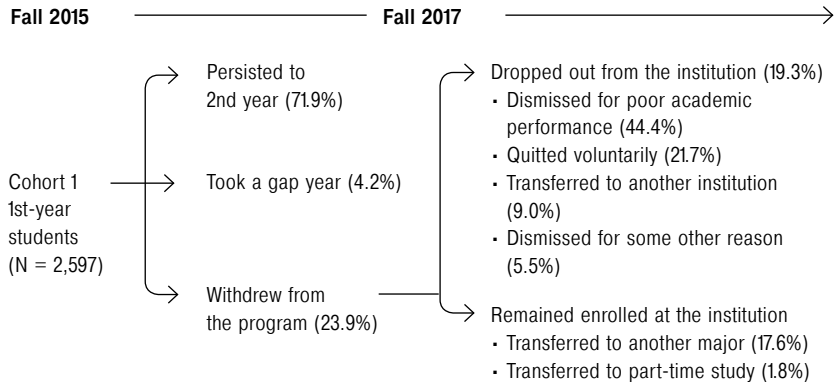
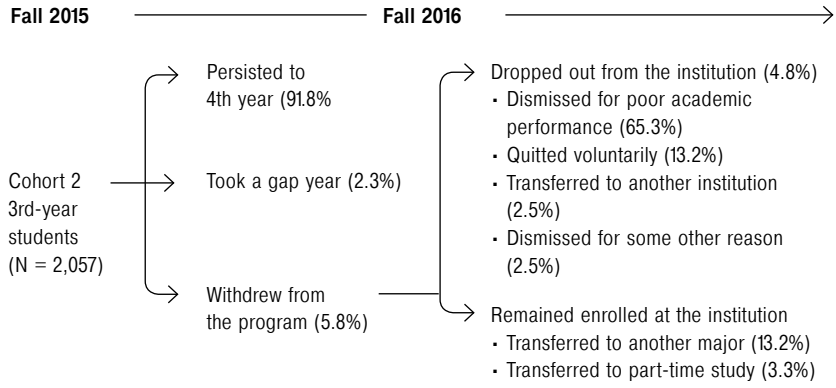


Figure 2. **Trajectories of students in Cohort 2**



had dropped out from their initial programs, 19% in Cohort 1 and 5% in Cohort 2 had left the institution, which we classify as institutional dropout in this study[10].

Data on the reasons for non-participation in the second round of the survey was obtained from institutional directives concerning dismissals, transfers and academic leaves as well as students' explanatory statements.

[10] There is no possibility of demarcating between institutional and system dropout in this study, as the available data does not allow predicting whether a student will withdraw from postsecondary education without getting a degree at all.

Poor academic performance is the main cause of dismissal, accounting for 44% of dropouts in Cohort 1 and 65% in Cohort 2 (Figures 2 and 3). Low performance is followed, in descending order of prevalence, by voluntary withdrawal (22 and 13%, respectively), transfer to another major within the same institution, transfer to another institution, and transfer to part-time study.

Some groups of questions about educational background were not asked to all students, so data from a random subsample was used during the first three semesters. As the subsample was selected randomly, it was still representative.

Female students accounted for 23% of that subsample; the majority of the respondents (68%) had at least one college-educated parent; 59% studied computer science[11], and 41% were enrolled in electronic engineering programs[12]; the vast majority of students were subsidized by the government (91%)[13]; 36% had had subject-oriented instruction in secondary school; average USE score in mathematics in the subsample was 59 (out of 100); 29% of the students were enrolled in highly selective universities.

3. Measurements

The dependent variable in this study is institutional dropout as an indicator of quitting the institution for either of the following reasons: poor academic performance, voluntary withdrawal or transfer to another institution. The institutional dropout rate within the subsample was found to be 16.7% (Table 1).

Table 1 presents descriptive statistics on the independent variables used for analyzing the factors of dropout during the first three semesters (Cohort 1).

3.1. Background Characteristics

Individual characteristics of students and their families analyzed in the study include gender, major, economic status of family[14] and parental education. USE score in mathematics as well as physics and

[11] The following majors were included in this category: Mathematics and Computer Science, Fundamental Informatics and Information Technologies, Software and Administration of Information Systems, Informatics and Computing, Information Systems and Technologies, and Applied Informatics.

[12] The following majors were included in this category: Software Engineering, Information Security, Radio-Frequency Engineering, ICT and Communications Systems, Electronics Design and Technology, Electrical and Power Engineering, Electronics and Nanoelectronics, Instrumentation and Control Engineering, Optics and Laser Technology, Photonics and Optoinformatics, and Opto-Engineering.

[13] This parameter was omitted in subsequent analysis due to its low variance within the sample.

[14] The index "economic status of family" was constructed using Polychoric Principal Component Analysis based on binary variables indicating the presence/absence of various household items (e. g. refrigerator, microwave, etc.). As a result, we identified one factor that explained 56% of the vari-

Table 1. **Descriptive statistics for variables in the Cohort 1 subsample (N = 1,049)**

	Share or mean value / standard error
Institutional dropout	16.7
Individual and family background characteristics	
Female	0.23
Computer science	0.59
Electronic engineering	0.41
At least one college-educated parent	0.68
Economic status of family	0.0 / 0.8
Economic status of family: bottom quartile	0.29
Educational background	
Physics and mathematics oriented instruction	0.40
USE score in mathematics	59.4 / 15.0
USE score in mathematics: bottom quartile (below 50)	0.31
Institutional commitment	
Major of preferred choice	0.82
Institution of preferred choice	0.79
Academic integration	
Attendance of over 80%	0.88
Factor reflecting the frequency of interactions with faculty	0.03
Social integration	
Number of groupmates with whom students prepared for class or discussed study-related issues	3.11 / 2.8
Involvement in at least one extracurricular activity at college	0.62
Institutional characteristics	
Highly selective university	0.29

mathematics oriented instruction were used as indicators of educational background. Economic status and USE scores were converted into quartiles, and only the bottom quartile variables were used in analysis, i. e. the variables reflecting the lowest socioeconomic backgrounds and the lowest level of math performance. The bottom quartile for USE scores was represented by students who scored below 50.

3.2. Institutional Commitment

Institutional commitment of students that reflects their loyalty to the university and intention to persist in their major was assessed using the following Yes/No questions: "Did you enter the college of your preferred choice?" and "Did you enroll in the major of your preferred choice?" A similar assessment method was used in the study [Braxton, Milem, Sullivan 2000].

3.3. Social Integration

Indicators of social integration include involvement in extracurricular activities and the number of groupmates (up to ten) with whom students prepared for class or discussed study-related issues. Students were asked to choose the college extracurricular activities they engaged in from the list: student associations, sports clubs, arts (music, choir, student theater, etc.) and volunteering [Tinto 1993]. The analysis used a binary variable indicating involvement in at least one of the activities listed, which applied to 62% of the students.

3.4. Academic Integration

Formal compliance to academic requirements—class attendance and frequency of interactions with faculty—were used as indicators of academic integration. Class attendance was assessed using the question, "What is the share of classes (lectures, seminars) that you usually miss?" Students could choose a quintile from 0–20% to 81–100%. This variable was dichotomized due to small numbers of respondents in some categories, so only the variable indicating the attendance rate of over 80% was used in regression analysis.

The frequency of in- and out-of-class interactions with faculty was measured using four questions, such as, "On average, how often math professors ask you personally to answer their questions in class?" and "On average, how often do you communicate with math professors during the break or right after the class?" Students were asked to assess the frequency of their interactions on the four-point scale, choosing among "Never or almost never", "At least once a semester", "At least once in every 4–5 classes" and "At least once in every class". Using principal component analysis, we identified one factor that explained 55% of the total variance and was of sufficient internal consistency (Cronbach's alpha = 0.72). High levels of this factor reflect a high frequency of student–faculty interactions.

ance, which we then divided into quartiles to facilitate interpretation in the regression model.

3.5. Institutional Characteristics

Selectivity was the only institutional characteristic of colleges measured. In our sample, the top 25% (the top quartile) of colleges with the highest minimum USE score in mathematics required for admission, according to data obtained from the 2015 Monitoring Study of the Quality of Enrollment to Russian Universities[15], were classified as highly selective.

4. Data Analysis Strategy

In this study, we assess the factors of institutional dropout among computer science and engineering undergraduates in Russia during the first three semesters (Cohort 1), as this is when they face the highest risk of departure from the institution or major [Gruzdev, Gorbunova, Froumin 2013; Ishitani 2016]. Series of binary logistic regressions with subsequent addition of variable sets were used to evaluate the risk of institutional dropout. Model 1 contains only educational background characteristics. Model 2 also includes variables reflecting students' institutional commitment. Model 3 features indicators of academic integration. In Model 4, indicators of social integration are added. Finally, Model 5 also has a variable that describes the level of college selectivity. Each model reflects the odds ratios (OR) of the risk of dropping out as a function of the independent variables. As the analyzed student characteristics may vary across student groups, standard errors were estimated using the Huber–White sandwich estimator to prevent observations from violating the independence assumption [Freedman 2006].

5. Factors of Institutional Dropout during the First Three Semesters

Table 2 shows the results of regression analysis. The mean variance inflation factor (VIF) of 1.09 indicates no multicollinearity. Insignificance of the Hosmer–Lemeshow test statistic (Chi^2=10.81; p = 0.21) means that the full model (model 5) is well-calibrated and allows making quite accurate predictions. The only module of questions significantly affecting model quality (judging by the significant decrease in the Bayesian Information Indicator (BIC)) was the one concerning academic integration. The other groups of variables contribute relatively little to explaining the attrition. The model classifies 84% of observations correctly.

Background characteristics. The risk of dropping out by the second-year midterm is associated with the level of secondary school performance, students with the lowest USE scores (the bottom quartile) being 50% more likely to drop out than students in the other quartiles (OR = 1.61, model 5). Subject-oriented instruction and other individual characteristics, in particular economic status, are not related to the risk of departure.

[15] https://ege.hse.ru/

Table 2. **Factors of institutional dropout, Cohort 1, binary logistic regression, odds ratios (OR)**

	(1)	(2)	(3)	(4)	(5)
Individual and background characteristics					
Female	0.782 (0.179)	0.767 (0.171)	0.730 (0.164)	0.743 (0.170)	0.738 (0.167)
At least one college-educated parent	1.138 (0.209)	1.149 (0.209)	1.118 (0.213)	1.130 (0.215)	1.166 (0.223)
Economic status of family: bottom quartile	1.324 (0.250)	1.336 (0.246)	1.145 (0.206)	1.149 (0.207)	1.135 (0.203)
Computer science (base: electronic engineering)	1.277 (0.282)	1.452* (0.328)	1.292 (0.304)	1.278 (0.302)	1.271 (0.300)
Physics and mathematics oriented instruction	0.975 (0.179)	0.946 (0.176)	0.935 (0.183)	0.936 (0.183)	0.953 (0.189)
USE score in mathematics: bottom quartile	1.659*** (0.284)	1.595*** (0.273)	1.694*** (0.313)	1.723*** (0.317)	1.610** (0.305)
Institutional commitment					
Major of preferred choice		0.512*** (0.111)	0.560** (0.129)	0.555** (0.128)	0.550*** (0.126)
Institution of preferred choice		0.922 (0.208)	1.224 (0.314)	1.185 (0.304)	1.207 (0.308)
Academic integration					
Attendance of over 80% (base: below 80%)			0.206*** (0.045)	0.217*** (0.048)	0.217*** (0.047)
Frequent interactions with faculty			0.793*** (0.048)	0.809*** (0.054)	0.810*** (0.055)
Social integration					
Involvement in at least one extracurricular activity (base: no)				0.954 (0.188)	0.942 (0.186)
Number of groupmates with whom students prepared for class or discussed study-related issues				0.951 (0.033)	0.953 (0.033)
Institutional characteristics					
High selectivity[a]					0.696 (0.188)
Constant	0.130*** (0.032)	0.222*** (0.067)	0.663 (0.250)	0.771 (0.318)	0.845 (0.346)
BIC Log-likelihood	979.4 −465.3	982.3 −459.8	928.0*** −425.7	939.6 −424.6	943.6 −472.54
Adjusted pseudo-R2	0.02	0.03	0.10	0.10	0.10
Number of observations	1,047	1,047	1,047	1,047	1,047

Notes: Standard errors adjusted for clustering in 139 student groups.

[a] Along with selectivity, special status of the institution (Project 5–100, federal university) was also assessed as a possible factor of dropout. For the purpose of parsimony, the final model only included the selectivity variable, which produced a greater increase in the adjusted R^2.

***—*p<0*.01, **—p<0.05, *—p<0.1

Institutional commitment. Attending the institution of preferred choice is not related to the chances of dropping out—students who did not enter the institution of their preferred choice are not at risk of being dismissed within the first three semesters. Meanwhile, the chances are twice as low for students matched to their major (OR = 0.55, model 5). However, these results should be treated with caution, as adding the indicators of institutional commitment does not improve model quality.

Academic integration. The hypothesis on the relationship between academic integration and college dropouts has been confirmed. Regression results show that both attendance and frequency of interactions with faculty correlate with college attrition rates. Students attending over 80% of classes are 4.5 times less likely to drop out as compared to those with lower levels of attendance (OR = 0.22). The chances of dismissal are also higher for students less frequently interacting with faculty.

Social integration. Contrary to expectations, analysis results provide no evidence of socialization in college protecting against departure—both indicators of social integration were found to be insignificant.

Institutional characteristics. The variable indicating high selectivity of an institution is not related with the chances of dropping out, which points to the lack of significant differences in the attrition rates between highly selective and non-selective colleges.

6. Limitations

The most important limitation of this study is the problem of defining institutional dropout. On one hand, our study is the first to provide extensive and detailed information on the causes of departure from Russian universities, as it relies on administrative data. On the other hand, the reasons for withdrawal specified in institutional documents may have nothing to do with the actual student motivations or circumstances. For instance, a student facing dismissal may have transferred to another major, and a student who voluntarily decided to quit may have stopped attending classes and been later formally dismissed for poor academic performance. To obtain more accurate data on the motivations and circumstances of college withdrawals, studies must use qualitative methods, such as interviewing. No research of this kind has been attempted in Russia so far.

Another limitation is the lack of data on academic performance, which is considered to be a key predictor of dropping out [Pascarella, Terenzini 2005; Mayhew et al. 2016]. However, the analyzed indicators of academic integration may be even more helpful. Indeed, academic performance may reflect student effort just as well as course difficulty or college selectivity—being an A student in a non-selective university is easier than in a highly selective one due to the latter's higher quality standards [Roschin, Rudakov 2015].

Other factors possibly related to college dropouts but not covered in this study include place of residence and type of funding [Tinto 1993]. Students who move to another city or region for college may face additional challenges associated with accommodation expenses and adapting to the new location and lifestyle. Unlike data on enrollees from other cities and regions, information on the type of funding was available for analysis, but adding it to the models had little sense as most respondents (93%) were subsidized by the government.

7. Conclusion and Discussion

STEM education has been a priority in present-day Russia, which is in line with the global trend of increasing the population and quality of graduates from STEM programs to promote economic growth and a knowledge-based economy [National Academy of Science 2007]. Nearly half of all the government-funded places in higher education are provided in STEM majors. At the same time, attrition rates have been the highest in this field, indicating ineffectiveness of college retention strategies and unfeasibility of government investments [Kondratjeva, Gorbunova, Hawley 2017].

This study is the first to analyze the phenomenon of college dropouts in Russia on a large nationally representative sample of computer science and engineering undergraduates using administrative data on student dismissals. The findings shed more light on the factors of withdrawal among engineering students, who are at the highest risk of being dismissed as compared to other majors, according to earlier studies (e. g. [Schwab, Sala-i-Martín 2016; Kondratjeva, Gorbunova, Hawley 2017]).

It is shown that, during the first three semesters, 72% of undergraduates remain within their initial academic track, i. e. enrolled in the same major at the same university, and one in every five students drops out (19%). Average attrition rate between the 3rd and 4th years is only 5%, which is much lower. These results are consistent with earlier findings in which the highest attrition rates were observed within the first two years of college study [Bowen et al. 2009; Kolotova 2011; Kondratjeva, Gorbunova, Hawley 2017].

Analysis of the factors of college dropouts during the first three semesters relies on Tinto's theoretical framework [Tinto 1993], which postulates that social and academic integration are critically important to the retention and success of students in the university of choice. Our findings confirm the significance of academic integration, the risk of dropping out being much lower among students who attend most classes and engage in in- and out-of-class interactions with faculty more often.

An accessible practice to control college attrition rates in this case is to ensure monitoring and support for at-risk students who miss a lot of classes and interact little with the faculty. Because faculty members tend to adopt an accusatory attitude towards students, argue

for stringent dismissal policies [Terentev, Gruzdev, Gorbunova 2015] and handle heavy workloads, they should be provided with additional incentives and assistance in monitoring struggling students for attrition rates to actually go down. However, involvement in learning may decrease not only as a result of faculty's "negligence" but also because students may lack or lose interest or revise their goals. Otherwise speaking, the effects of monitoring and supporting low-involved students may be very moderate.

Significance of pre-college performance in the regressions indicates that colleges either apply little effort to retain undergraduates or have low admission requirements. Students with low USE scores in mathematics (50 or below) find themselves at risk of dropping out, regardless of their levels of academic and social integration or college selectivity. Such results may indicate that universities admit relatively low performers and apply little effort to bridge the gap between the low level of schooling and university requirements. To solve this problem, universities should invest in academic support mechanisms, such as remedial courses, mentoring and tutoring [Gorbunova, Kondratjeva 2013]. The prevalence of such practices in Russia's present-day higher education is obviously too low [Zagirova et al. 2019].

The hypothesis about the relationship between social integration and the risk of dropping out was not confirmed in this study. International studies on student involvement in university life focus a lot on and confirm the significance of social integration as a factor of departure decisions [Tinto 1993; Mayhew et al. 2016]. To some extent, this key role of social integration is explained by the great effort invested by Western universities to ensure an environment conducive to peer interactions, as they offer a variety of extracurricular activities to choose from and often design their campuses to naturally stimulate communication among students, which can rarely be found in Russia [Bekova, Kasharin 2018].

The hypothesis about the impact of institutional commitment—students' loyalty to their selected institution and major—has been partially confirmed. Students who did not enter the college of their preferred choice do not face a higher risk of dropping out. Meanwhile, being unmatched to one's major is a significant factor of withdrawal. Further research is needed to find out why institutional dropouts are associated with the wrong choice of major, but not institution.

The absence of variance in the chances of dropping out among students of different social backgrounds means that there is no reproduction of educational inequality in relatively low socioeconomic backgrounds, all other factors being controlled for.

We also expected to find higher attrition rates in highly selective universities [Kondratjeva, Gorbunova, Hawley 2017], as elite institutions with abundant funding can afford "discarding" the lowest performers. However, the correlation between the risk of dropping out and college selectivity was found to be insignificant, so it is not the

quality of enrollment that explains the differences in attrition rates among colleges but rather the factors described above as well as some factors left beyond the scope of this study. For instance, as faculty play a key role in student attrition, the differentiating factors may also include student–faculty ratio [Mayhew et al. 2016], size of college funding, availability of academic support initiatives, etc.

References

Alon S., Tienda M. (2005) Assessing the "Mismatch" Hypothesis: Differences in College Graduation Rates by Institutional Selectivity. *Sociology of Education*, vol. 78, no 4, pp. 294–315.

Bean J. P. (1980) Dropouts and Turnover: The Synthesis and Test of a Causal Model of Student Attrition. *Research in Higher Education*, vol. 12, no 2, pp. 155–187.

Bean J., Eaton S. B. (2001) The Psychology Underlying Successful Retention Practices. *Journal of College Student Retention: Research, Theory & Practice*, vol. 3, no 1, pp. 73–89.

Bekova S., Kasharin M. (2018) Ne dlya shkoly, a dlya zhizni my uchimsya: kak studenty otsenivayut rol vneuchebnoy raboty [We Learn Not for School But for Life: How Students Assess the Importance of Extracurricular Activity]. *Monitoring of Public Opinion: Economic and Social Changes*, no 4, pp. 324–335.

Berger J. B. (2000) Optimizing Capital, Social Reproduction, and Undergraduate Persistence: A Sociological Perspective. *Reworking the Student Departure Puzzle* (ed. J. M. Braxton), Nashville: Vanderbilt University, pp. 95–124.

Bernardo A., Esteban M., Fernández E., Cervero A., Tuero E., Solano P. (2016) Comparison of Personal, Social and Academic Variables Related to University Drop-Out and Persistence. *Frontiers in Psychology*, vol. 7, October, Art. no 1610.

Blackie M., le Roux K., McKenna S. (2016) Possible Futures for Science and Engineering Education. *Higher Education*, vol. 71, no 6, pp. 755–766.

Bowen W. G., Chingos M. M., McPherson M.S. (2009) *Crossing the Finish Line: Completing College at America's Public Universities*. Princeton, NJ: Princeton University.

Braxton J. M., Milem J. F., Sullivan A. S. (2000) The Influence of Active Learning on the College Student Departure Process: Toward a Revision of Tinto's Theory. *The Journal of Higher Education*, vol. 71, no 5, pp. 569–590.

Brownstein D. (2014) Are College Degrees Inherited? Parents' Expectations with Education Strongly Influence What Their Children Do after High School. *Atlantic*. Available at: https://www.theatlantic.com/education/archive/2014/04/are-college-degrees-inherited/360532/ (accessed 20 July 2020).

Cook B., Hartle T. W. (2011) *Why Graduation Rates Matter—and Why They Don't*. Available at: https://www.acenet.edu/Documents/College-Graduation-Rates-Behind-the-Numbers.pdf (accessed 20 July 2020).

Deci E. L., Vallerand R. J., Pelletier L. G., Ryan R. M. (1991) Motivation and Education: The Self-Determination Perspective. *Educational Psychologist*, vol. 26, no 3–4, pp. 325–346.

Freedman D. A. (2006) On the So-Called "Huber Sandwich Estimator" and "Robust Standard Errors". *The American Statistician*, vol. 60, no 4, pp. 299–302.

Gansemer-Topf A.M., Schuh J. H. (2006) Institutional Selectivity and Institutional Expenditures: Examining Organizational Factors That Contribute to Retention and Graduation. *Research in Higher Education*, vol. 47, no 6, pp. 613–642.

Gokhberg L., Kovaleva N., Kuzminov Y. (eds) (2018) *Obrazovanie v tsifrakh: 2018. Kratkiy statisticheskiy sbornik* [Education in Figures: 2018. Pocket Data Book], Moscow: NRU HSE.

Gorbunova E. (2018) Vybytiya studentov iz vuzov: issledovaniya v Rossii i SShA [Elaboration of Research on Student Withdrawal from Universities in Russia and the United States]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 1, pp. 110–131. DOI: 10.17323/1814–9545–2018–1–110–131

Gorbunova E., Kondratjeva O (2013) Analiz gendernyh razlichij v vybytii iz vuza rossijskih i amerikanskih studentov programm bakalavriata [Analysis of Gender Differences in the Graduation of Russian and American Students from Undergraduate Programs]. *Universitas*, vol. 1, no 3, pp. 48–69.

Gorbunova E., Kondratjeva O., Hawley J. (2016) Izuchenie faktorov vybytiya studentov iz vysokoselektivnykh vuzov Rossii i USA [Studying of Students' Withdrawal Factors from Highly Selective High Schools of Russia and the USA]. Proceedings of the VII *Moscow International Conference of Higher Education Researchers "University between Global Challenges and Local Commitments"*, Moscow: HSE, pp. 87–91.

Gruzdev I., Gorbunova E., Froumin I. (2013) Studencheskiy otsev v rossiyskikh vuzakh: k postanovke problemy [Academic Dismissal in Russian Higher Education Institutions: Defining the Problem]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 2, pp. 67–81.

Ishitani T. T. (2016) Time-Varying Effects of Academic and Social Integration on Student Persistence for First and Second Years in College: National Data Approach. *Journal of College Student Retention: Research, Theory & Practice*, vol. 18, no 3, pp. 263–286.

Kamens D. H. (1971) The College "Charter" and College Size: Effects on Occupational Choice and College Attrition. *Sociology of Education*, vol. 44, Summer, pp. 270–296.

Kardanova E., Loyalka P., Chirikov I. et al. (2016) Developing Instruments to Assess and Compare the Quality of Engineering Education: The Case of China and Russia. *Assessment & Evaluation in Higher Education*, vol. 41, no 5, pp. 770–786.

Kolotova E. (2011) Izuchenie otchislenij studentov v bakalavriate/specialitete NIU VShE. [Study on Student Attrition of Undergraduate Students at NRU HSE]. *Monitoring universiteta,* no. 6, pp. 22–32.

Kondratjeva O., Gorbunova E., Hawley J. D. (2017) Academic Momentum and Undergraduate Student Attrition: Comparative Analysis in US and Russian Universities. *Comparative Education Review*, no 3, pp. 607–633.

Kuzminov Y., Yudkevich M. (2007) Universitety v Rossii i v Amerike: razlichiya akademicheskikh konventsiy [Universities in Russia and the US: Differences in Academic Concepts]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 4, pp. 141–158.

Kuzminov Y., Froumin I., Ovcharova L. (2018) *Dvenadtsat resheniy dlya novogo obrazovaniya: doklad Tsentra strategicheskikh razrabotok i Vysshey shkoly ekonomiki* [Twelve Solutions for New Education: A Report of the Center for Strategic Research and the Higher School of Economics]. Available at: https://www.hse.ru/data/2018/04/06/1164671180/Doklad_obraz (accessed 20 July 2020).

Loyalka P., Carnoy M., Froumin I., Dossani R., Tilak J. B., Yang P. (2014) Factors Affecting the Quality of Engineering Education in the Four Largest Emerging Economies. *Higher Education*, vol. 68, no 6, pp. 977–1004.

Loyalka P., Liu O. L., Li G. et al. (2019) Computer Science Skills across China, India, Russia, and the United States. *Proceedings of the National Academy of Sciences of the United States of America*, vol. 116, no 14, pp. 6732–6736.

Mayhew M. J., Pascarella E. T., Bowman N. A. et al. (2016) *How College Affects Students. Vol. 3: 21st Century Evidence that Higher Education Works*. San Francisco: John Wiley & Sons.

Melguizo T. (2008). Quality Matters: Assessing the Impact of Attending More Selective Institutions on College Completion Rates of Minorities. *Research in Higher Education*, vol. 49, no 3, pp. 214–236.

Melguizo T. (2011) A Review of the Theories Developed to Describe the Process of College Persistence and Attainment. *Higher Education: Handbook of Theory and Research* (eds J. Smart, M. Paulsen), Dordrecht, Heidelberg, London, New York: Springer Science & Business Media, vol. 26, pp. 95–424.

National Academy of Science (2007) *Rising above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*. Available at: https://s3.wp.wsu.edu/uploads/sites/618/2015/11/Rising-Above-the-Gathering-Storm.pdf (accessed 20 July 2020).

Pascarella E. T., Terenzini P. T. (2005) *How College Affects Students. Vol. 2: A Third Decade of Research.* San Francisco: Jossey-Bass.

Schwab K., Sala i Martin X. (2016) *The Global Competitiveness Report 2016–2017* // World Economic Forum. Available at: http://repositorio.colciencias.gov.co:8080/handle/11146/223 (accessed 20 July 2020).

Sneyers E., De Witte K. (2014) *The Interaction between Dropout, Graduation Rates and Quality Ratings in Universities. TIER Working Paper Series TIER WP 14/19*.

Sokolov S. (2017) Mif ob universitetskoy strategii. Ekonomicheskie nishi i organizatsionnye karery rossiyskikh vuzov [The Myth of University Strategy. Market Niches and Organizational Careers of Russian Universities]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 2, pp. 36–73.DOI: 10.17323/1814–9545–2017–2–36–73

Spady W. G. (1970) Dropouts from Higher Education: An Interdisciplinary Review and Synthesis. *Interchange*, vol. 1, no 1, pp. 64–85.

Strauss L. C., Volkwein J. F. (2004) Predictors of Student Commitment at Two-Year and Four-Year Institutions. *The Journal of Higher Education*, vol. 75, no 2, pp. 203–227.

Swail W. S. (2004) *The Art of Student Retention: A Handbook for Practitioners and Administrators*. Available at: https://files.eric.ed.gov/fulltext/ED485498.pdf (accessed 20 July 2020).

Terentyev E., Gruzdev I., Gorbunova E. (2015) Sud idet: diskurs prepodavateley ob otseve studentov [The Court Is Now in Session: Professor Discourse on Student Attrition]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 2, pp. 129–151. DOI: 10.17323/1814–9545–2015–2–129–151

Timofeeva A., Avrunev O. (2016) Otchisleniya studentov v protsesse obucheniya: obyasnitelnaya sila EGE [Expulsion of Students: The Explanatory Power of the Unified State Examination]. *We Continue the Tradition of Russian Statistics. Collection of Reports of the First Open Russian Statistical Congress (Novosibirsk, 2015, October 20–22)*, pp. 133–140.

Tinto V. (1975) Dropout from Higher Education: A Theoretical Synthesis of Recent Research. *Review of Educational Research*, vol. 45, no 1, pp. 89–125.

Tinto V. (1993) *Leaving College: Rethinking the Causes and Cures of Student Attrition*. Chicago: University of Chicago.

Valeeva D., Dokuka S., Yudkevich M. (2017) Razryv druzheskikh svyazey pri akademicheskom neuspekhe: sotsialnye seti i peresdachi u studentov [How Academic Failures Break Up Friendship Ties: Social Networks and Retakes]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 1, pp. 8–24. DOI: 10.17323/1814–9545–2017–1–8–24

Vignoles A. F., Powdthavee N. (2009) The Socioeconomic Gap in University Dropouts. *The BE Journal of Economic Analysis & Policy*, vol. 9, no 1, pp. 1–36.

Zagirova F., Romanenko K, Makareva A. (2019) *"I vse takie raznye" Akademicheskaya neodnorodnost' studentov: analiz, vospriyatie, praktiki* ["And all so different". Academic Heterogeneity of Students: Analysis, Perception, Practices], Moscow: HSE.

Russian Faculty's Attitudes Toward Using Math in Economics Courses

Authors

Alexander Myasnikov
Candidate of Sciences in Economics, Associate Professor, Academic Department of Political Economy and History of Economic Science, Plekhanov Russian University of Economics; Associate Professor, Department of Theoretical Economics, Faculty of Economic Sciences, National Research University Higher School of Economics.
E-mail: amyasnikov@hse.ru

Svetlana Seregina
Doctor of Sciences in Economics, Professor, Department of Theoretical Economics, Faculty of Economic Sciences, National Research University Higher School of Economics.
E-mail: sseregina@hse.ru

Address: 20 Myasnitskaya Str., 101000 Moscow, Russian Federation.

Abstract

Opinions of Russian economics professors are highly polarized as to how much mathematics should be used in teaching undergraduate economics. A number of faculty members believe that the use of math should be kept to an absolute minimum, with perhaps only the most basic plots and equations being included in the syllabus. In our study based on a survey of 160 Russian faculty members teaching economics, we analyze the factors behind faculty's beliefs about the adequacy of students' math skills and whether more or less math should be used in introductory economics courses. Our findings show that most economics professors in Russia consider their students' math skills to be insufficient, for various reasons, while agreeing that math helps learners to get a better grasp of certain aspects of economics. Meanwhile, they find the existing amount of math in introductory economics courses optimal. It appears that professors' views are significantly affected by their own perceptions of the role of mathematics in economics. In addition, there are some differences in opinions on a number of issues between professors in Moscow versus other regions of Russia.

Keywords

higher education, teaching economics, mathematical methods, mathematization of economics, mathematical skills in undergraduate students.

References

Agresti A. (2012) *Categorical Data Analysis*. New Jersey: John Wiley & Sons.

Anderson J. A., Philips P. R. (1981) Regression, Discrimination, and Measurement Models for Ordered Categorical Variables. *Applied Statistics*, vol. 30, no 1, pp. 22–31.

Avtonomov V., Ananyin O., Kuzminov Ya., Lipsits I., Lyubimov L., Nureev R., Radaev V. (2001) Ekonomicheskaya nauka, obrazovanie i praktika v Rossii v 90-e gody [Economics of the 1990s in Russia: Education and Practice]. *Voprosy Ekonomiki*, no 1, pp. 84–95.

Ballard C., Johnson M. (2004) Basic Math Skills and Performance in an Introductory Economics Class. *The Journal of Economic Education*, vol. 35, no 1, pp. 3–23.

Baygusheva I. (2015) *Metodicheskaya sistema matematicheskoy podgotovki ekonomistov v vuze na osnove formirovaniya obobshchennykh metodov resheniya tipovykh professionalnykh zadach* [Teaching Mathematics to Economics Undergraduates: A Methodology Based on Developing Generalized

Methods of Solving Routine Professional Tasks] (PhD Thesis). Astrakhan: Astrakhan State University.

Belokrylov K., Kivarina M., Myasnikov A., Ogurtsova E. (2019) Rol matematiki v prepodavanii bazovykh ekonomicheskikh distsiplin: mnenie studentov i rekomendatsii [The Role of Mathematics in Teaching Undergraduate Economics: Students' Opinions and Recommendations]. *The Journal of the New Economic Association*, no 3, pp. 116–150.

Besstrashnova Ya., Zvereva L. (2014) Ispolzovanie rezultatov nauchnykh issledovaniy v prepodavanii kursa "Ekonomicheskaya teoriya" [Using Research Findings in Teaching the Economic Theory Course]. *Opyt i problemy prepodavaniya distsipliny "Ekonomika" ("Ekonomicheskaya teoriya") dlya neekonomicheskikh napravleniy* [The Experience and Issues of Teaching Economics (the Economic Theory Course) in Non-Economic Majors] (ed. E. Dragomirova), St. Petersburg: Peter the Great Saint Petersburg Polytechnic University, pp. 25–28.

Chelnokova O. (2010) Spetsifika prepodavaniya ekonomiki na matematicheskikh spetsialnostyakh vuza [Specific Aspects of Teaching Economics in Math Majors]. *Metodika prepodavaniya ekonomiki: opyt i problemy* [Methodology of Teaching Economics: Practice and Issues] (ed. E. Ogurtsova), Saratov: Nauka, pp. 15–20.

Cheremisinov G., Pugachev I. (2012) Makrotrendy i porogovye izmeneniya sovremennoy rossiyskoy ekonomiki [Macro Trends and Threshold Changes of Modern Russian Economy]. *Izvestiya of Saratov University. New Series. Ser. "Economics. Management. Law"*, vol. 12, no 1, pp. 3–12.

Darlington E., Bowyer J. (2017) Students' Views of A-Level Mathematics as Preparation for Degree-Level Economics. *Citizenship, Social and Economics Education*, vol. 16, no 2, pp. 100–116. DOI:10.1177/2047173417716423.

Dobryakova M., Androuschak G. (2010) Priem v rossiyskie gosudarstvennye vuzy v 2010 g.: uvidet, chtoby zadumatsya [Admission to Russian State Universities in 2010: To See and to Start Thinking]. *Voprosy obrazovaniya/Educational Studies Moscow*, no 4, pp. 101–121. DOI:10.17323/1814-9545-2010-4-101-121.

Dubovik M. (2013) "Bolevye tochki" v prepodavanii ekonomicheskoy teorii, ili ot "teaching" k "learning" [The "Pain Points" in Teaching Economic Theory; or, From Teaching to Learning]. *Metodika prepodavaniya ekonomicheskikh distsiplin: Materialy XIV Drukerovskikh chteniy* [The Methodology of Teaching Economic Disciplines: Proceedings of the 14th Drucker Readings] (ed. R. Nizhegorodtsev), Moscow: Voskhod-A Research, Information, Manufacturing and Commercial Center, pp. 107–111.

Geraci A., Fabbri D., Monfardini C. (2016) Testing Exogeneity of Multinomial Regressors in Count Data Models: Does Two-Stage Residual Inclusion Work? *Journal of Econometric Methods*, vol. 7, no 1, pp. 1–19. DOI:10.1515/jem-2014-0019.

Kolesov D. N. (2009) O matematicheskoy podgotovke v magisterskikh programmakh po napravleniyu "Ekonomika" [Mathematical Basis for Master's Programs in the Economic Education]. *St Petersburg University Journal of Economic Studies*, no 5, pp. 155–158.

Maltsev A. (2016) Rossiyskoe soobshchestvo ekonomistov: osobennosti i perspektivy [Russian Community of Economists: Main Features and Perspectives]. *Voprosy Ekonomiki*, no 11, pp. 135–158.

Nikitina N. (2017) Alternativnye podkhody k prepodavaniyu kursa makroekonomiki na ekonomicheskom fakultete MGU im. M. V. Lomonosova [Alternative Approaches to Teaching Macroeconomics in the Faculty of Economics of Lomonosov Moscow State University]. *Sovremennoe ekonomicheskoe obrazovanie v vysshey shkole i vyzovy novoy ekonomiki (materialy kruglogo stola)* [Economics Education in Modern Higher Education Contexts and

Challenges of the New Economy (Proceedings of a Roundtable)], Astana: Kazakhstan Branch of Lomonosov Moscow State University, pp. 54–61.

Nikitina N. (2011) *Metodika prepodavaniya ekonomiki. Uchebnoe posobie* [Methodology of Teaching Economics: A Teacher Guide]. Moscow: Lomonosov Moscow State University.

Polterovich V., Fridman A. (1998) Ekonomicheskaya nauka i ekonomicheskoe obrazovanie v Rossii: problema integratsii [Economic Science and Economics Education in Russia: The Problem of Integration]. *Ekonomicheskaya nauka sovremennoy Rossii/Economics of Contemporary Russia*, no 2, pp. 112–122.

Prakhov I. (2011) Prepodavanie ekonomiki: est li alternativa lektsiyam? (obzor podkhodov) [Teaching Economics: Is There Any Alternative to Lections?]. *Voprosy obrazovaniya/Educational Studies Moscow*, no 1, pp. 143–160. DOI:10.17323/1814-9545-2011-1-143-160.

Rudakova I. (2011) Ekonomicheskaya teoriya, realnost i konkretno-istoricheskie distsipliny: problemy vzaimodeystviya [Economic Theory, Reality and Concrete-Historical Disciplines: Interaction Problems]. *Nauchnye issledovaniya ekonomicheskogo fakulteta. Elektronny zhurnal/Scientific Research of Faculty of Economics. Electronic Journal*, no 3 (1), pp. 31–48.

Rudi L. (2016) Rol ekonomicheskoy teorii v povyshenii kachestva podgotovki ekonomistov v ekonomicheskom vuze [The Role of Economic Theory in Improving the Quality of Economics Programs in Economics-Oriented Universities]. *Kachestvo i poleznost v ekonomicheskoy teorii i praktike: materialy VIII Vserossiyskoy zaochnoy nauchno-prakticheskoy konferentsii* [Quality and Usefulness in the Theory and Practice of Economics: Proceedings of The 8th All-Russia Virtual Academic Conference] (ed. L. Rudi), Novosibirsk: Novosibirsk State University of Economics and Management, pp. 37–44.

Staub K. (2009) Simple Tests for Exogeneity of a Binary Explanatory Variable in Count Data Regression Models. *Communications in Statistics—Simulation and Computation*, vol. 38, no 9, pp. 1834–1855. DOI:10.1080/03610910903147789.

Tutov L., Rogozhnikova V. (2018) Dilemma "economist ili matematik": vzglyad filosofii [Dilemma "Economist or Mathematician": A Philosophical Perspective]. *Vestnik Moskovskogo universiteta. Ser. 6. "Ekonomika"*, no 1, pp. 3–17.

Valdaytsev S. V., Lezina T. (2012) Aktualnye problemy povysheniya urovnya universitetskogo ekonomicheskogo obrazovaniya v Rossii [Central Problems of Enhancing of University Economic Education in Russia]. *St Petersburg University Journal of Economic Studies*. Ser. 5, pp. 83–93.

Varshavskaya E., Kotyrlo E. (2019) Vypuskniki inzhenerno-tekhnicheskikh i ekonomicheskikh spetsialnostey: mezhdu sprosom i predlozheniem [Engineering and Economics Graduates: Between Demand and Supply]. *Voprosy obrazovaniya/Educational Studies Moscow*, no 2, pp. 98–128. DOI:10.17323/1814-9545-2019-2-98-128.

Educational and Career Trajectories of Extramural Students and Graduates of Higher Education

G. Cherednichenko

Received in April 2020

Galina Cherednichenko
Doctor of Sciences (Sociology), Chief Researcher, Institute of Sociology of the Federal Center of Theoretical and Applied Sociology of the Russian Academy of Sciences. Address: 24/35 Krzhizhanovskogo St, 117218 Moscow, Russian Federation. Email: galcher2211@gmail.com

Abstract. The results of a 2019 sociological survey conducted on a nationwide structured sample of extramural students (2019) and graduates (2000–2018) of Higher Educational Institutions (HEIs)[1] are used to construct the social portrait of extramural students and graduates and identify the types of their educational strategies as well as the motives that led them to extramural studies. We compare the expected and experienced effects of education on graduates' positions in the labor market and analyze their movements within the socio-occupational hierarchy as a result of obtaining that education.

Extramural students differ from full-timers in that they feature a more democratic socioeconomic composition, possess a different amount of educational resources at the enrollment stage, and have specific needs, the most important one being that of entering the labor market and/or compensating for one's reduced competitiveness. A large proportion of extramural students already have a vocational school diploma, which reflects the growing popularity of the bypass strategy to access higher education among certain social groups, which allows them to slip past the obligatory high-stakes testing. Educational capital of HEIs candidates (corresponding to four types of educational trajectories of extramural students) correlates with their socioeconomic backgrounds. The advantages and disadvantages of educational background at baseline extend into the next stage of education. Similarly, differences in social and occupational status at entry further translate into different degrees of success in converting qualifications into degree-matching statuses.

Keywords: higher education, extramural studies, college students, graduates, educational trajectories, application of HEIs degrees in the labor market.

DOI: 10.17323/1814-9545-2020-3-165-187

[1] Higher Educational Institutions (all Russian higher education) are represented by colleges and universities at the same time. They may now be called a university (for example Lomonosov Moscow State University, Tyumen Industrial University), an academy (for example the Altai Academy of Economics and Law), an institute (for example Voronezh State Institute of the Arts) or a school (for example the Moscow School of Social and Economic Sciences).

Translated from Russian by I. Zhuchkova.

Expansion of higher education in Russia has involved growing enrollment in full-time as well as extramural programs. Between 2010 and 2015, extramural students accounted for 52.1 to 46.9% of total enrollment and extramural graduates for 48.4 to 43.3% of all Higher Education (HE) graduates, the last few years showing a slightly downward trend (39.3% and 40.5% in 2018, respectively) [National Research University Higher School of Economics 2020: 181, 194]. However, higher education research is mostly focused on full-time programs. Meanwhile, extramural students play a significant role not only as a substantial percentage. By combining work and extramural study, broad social groups can satisfy their vital needs and get the otherwise inaccessible opportunity to upgrade their educational level and qualifications, adjust to the volatile demand, and become more competitive in the labor market.

On the one hand, massification of higher education has solved the vital issue of democratization in education. At the other hand, it has resulted in degradation of education quality standards, devaluation of degrees in the labor market, and a growing imbalance in fields of study in higher and vocational education [Zubok, Chuprov 2015; Klyucharev 2015; Konstantinovskiy, Popova 2015; Klyachko 2016; Belyakov, Klyachko, Polushkina 2018].

The quality of human capital formed by extramural HE depends not only on how educational processes are organized or the structural indicators of such organization, but it is also largely determined by students' educational, cultural and social characteristics. For this reason, it is important to construct the social portrait of extramural college students to find out what educational backgrounds they bring to college and how they use the acquired knowledge and skills in their professional life.

1. Trending Areas in Research on Educational and Career Trajectories of Youth

Russia's recent sociological studies on youth's educational and career trajectories feature comprehensive and differentiated analysis. The main focus is on how real choices are affected by a set of factors, including objective and subjective factors, external social determinants and young adults' strategies. A series of methodologically related projects [Cherednichenko 2001; 2014; Konstantinovskiy, Voznesenskaya, Cherednichenko 2014] explore the influence of demographics, labor market conditions, education system quality and, most importantly, ascribed characteristics (parental education and socioeconomic status, place of residence, gender, etc.) on educational and career trajectories of different groups of youth, including high school graduates, vocational school graduates (two types of programs), young blue-collar workers and rural youth. Educational and career trajectories are investigated from a chronological [Konstantinovskiy 1999; Konstantinovskiy et al. 2015], cohort [Konstantinovskiy et al. 2011] and regional [Kharchenko 2008] perspectives. More specific issues, such as grad-

uate career tracking or correlations between accumulated educational capital and employment, have been studied for particular occupations groups or universities [Donetskaya, Dovgal 2018; Sandler et al. 2018; Yushkina 2019].

In major cross-cultural and monitoring studies of the recent years, trajectories have been approached as a many-staged cumulative process unfolding as a function of family background, types of educational institutions, employment history, etc. The life course approach suggests concentrating research efforts on a human being's journey through the education system where past decisions and behavior affect decisions and behavior in the future. Researchers analyze the primary and secondary effects of social background on the learning process and educational choices of middle and high school graduates, describe specific strategies of different social groups [Bessudnov, Malik 2016; Kosyakova et al. 2016; Khavenson, Chirkina 2019] and examine how institutional and cultural changes prompted by social development affect gender segregation in the labor market [Kosyakova, Kurakin 2016].

2. Project of the Institute of Sociology of FCTAS RAS

An integrated sociological study of demand for extramural higher education among certain population groups, their social behavior in education, the quality of extramural education across HEIs, application of such education and how it is converted into careers and qualifications-matching positions in the labor market has been administered by the Institute of Sociology of the Federal Center of Theoretical and Applied Sociology of the Russian Academy of Sciences with the financial support of the Russian Foundation for Basic Research. The study includes a dynamic analysis of primary statistics for 2000–2017 posted on the website of the Ministry of Education and Science of Russia and in official statistics reports [Cherednichenko 2018], analysis of the findings of the Russian Longitudinal Monitoring Survey conducted by the Higher School of Economics (RLMS-HSE) [Cherednichenko 2019], a 2019 online survey of extramural students 2019 and extramural graduates 2000–2018, and 42 in-depth interviews with 19 extramural students and 23 extramural graduates with 3 to 15 years of post-graduation work experience (from among the 2019 online survey participants).

In this article, we only use the survey results but not the interview transcripts. Such definition of empirical basis entails inevitable limitations in some research aspects, such as in identifying the social groups that would be outsiders in the competition for HEI admission if they had no access to extramural programs, outlining the specific needs, limitations and life circumstances associated with choosing the extramural mode of study, characterizing the key types of educational and career trajectories pursued by extramural students and the specific aspects of trajectory planning and implementation, describing extramural HE graduates' pre- and post-graduation positions in

the labor market and their strategies of applying and converting the skills they have acquired, etc.

A survey of extramural HE students 2019 and graduates released in 2000–2018 was administered online in May 2019 by the Tiburon Research agency, which ensured a representative sample by providing a nationwide online panel of 550,000 respondents structured by 12 indicators including gender, age, personal and family income, marital status, financial standing, occupation and position held. The sample included extramural HE students and graduates from all Russian cities with population over 500,000. The student subsample was obtained with regard to government statistics on participation of youth (population aged 17–25) in all types of higher education programs (31.8% in 2016) and the percentage of extramural students in total HE enrollment (40.8% in the academic year 2017/18). The graduate subsample was obtained with regard to government statistics on the percentage of extramural graduates in the total population of HE graduates (for every year between 2000 and 2017) and youth participation in all types of higher education programs (for every year between 2000 and 2017). Statistics was compiled using questionnaire responses from 212 extramural students and 213 extramural graduates. Both subsamples feature the same proportion of male to female respondents, which equals 35.3 to 64.7%. The student subsample had 11.8% of the respondents aged 18–20, 38.7% aged 21–25, 32.1% aged 26–30 and 17.4% aged 31–35. In the graduate subsample, 3.4% were aged 18–25, 14.5% aged 26–30, 31.6% aged 31–35, 27.6% aged 36–40 and 23.0% aged 41–45.

The survey was based on two questionnaires, one for students (28 items) and one for graduates (29 items). Twenty-eight items are nearly identical in both questionnaires, except that seven of them have two alternative wordings to ask students about their current/projective situation and graduates about their past experience or outcomes (e.g "How the distance education that you receive will be useful for you?" vs. "How the distance education that you received was useful for you?" Special attention was paid to improving credibility and reliability of data obtained for several critical measures of objective situation, such as personal and family socioeconomic status, college ranking, major, etc. Data was collected from 14 written responses to open-ended questionnaire items, which were encoded by researchers using the Rosstat[2] classifiers and their clickable links as well as the RAEX Russia's university rankings.

3. Educational Trajectories

3.1. The Social Portrait of Extramural Students and Graduates

It would be quite natural to expect that extramural HEIs learners come from lower sociocultural backgrounds than their full-time peers and students of selective universities. Back in the Soviet times, extramu-

[2] Federal State Statistics Service of Russia

ral programs were explicitly designed to provide access to higher education for young blue-collar workers and rural youth, i. e. those who could not afford not working while studying.

Graduates of vocational schools accounted for 31.7% of fathers and 42.0% of mothers of the respondents, constituting the modal group among parents by the level of educational attainment (measured at respondent graduation from secondary school). They are followed by HE-educated parents, who account for 29.2% of fathers and 32.6% of mothers. The lower educational levels of primary vocational school and middle school are found more often among fathers (16.6 and 13.4%, respectively) than mothers (10.1 и 11.0%) of extramural students and graduates. As for the socioeconomic distribution of parents assessed at respondent graduation from secondary school, the modal group and those adjacent to it appear to be highly polarized between fathers and mothers. The highest frequency group among fathers is "skilled workers" (35.7%), followed by "semiskilled workers" (23.5%), while the modal group among mothers is "mid-level professionals (25.9%), immediately followed by "highly skilled professionals" (21.9%). The major aggregate groups of blue- and while-collar workers are polarized likewise, accounting for 61.7% and 29.3% among fathers and 21.9 and 73.2% among mothers, respectively. Therefore, the trajectory of accessing higher education via extramural study is used most often by students taking a social elevator from blue-collar fathers and mothers employed in white-collar jobs most of which require no higher education degree.

Of all the respondents, 25.2% had attended rural schools, and 20% of those were raised by single mothers. When asked to rate on a five-point scale the financial standing of their family at the time of their being school graduates, 39.3% of extramural students and graduates selected the middle option ("We had enough money to afford decent food, clothing and even some durable goods") and 37.9% rated their family status one point lower ("We only had enough money to cover such basic needs as modest food, clothing and shoes, utility bills and household maintenance").

It follows therefore that extramural learners are recruited from low socioeconomic backgrounds, i. e. they have "weaker" positions in terms of their sociocultural capital and financial standing as compared to high school graduates who most often enroll in full-time higher education programs [Khavenson, Chirkina 2019:547–550]. The extramural mode of study thus serves to make higher education more accessible and promote social mobility in the current context of growing inequality of resource and opportunity.

The socioeconomic status affected directly the motives that the respondents used to explain why they had not enrolled in a full-time program. Being free to select up to three out of eleven possible reasons suggested, they mostly chose income-related ones. The option "I had to start working and making money" was chosen by 52.0% of the re-

spondents, “I considered combining work and study to be a more rational choice” by 29.9%, and “I had no money to pay for full-time education” by 22.5%. A low level of self-perceived competitiveness was mentioned much less often as a reason behind choosing extramural studies, only 12.9% of the respondents selecting either “I failed to be admitted to a full-time program” or “I was not eligible for a government-subsidized place in a full-time program”.

3.2. Pre-Higher Education Trajectories

Admission to extramural higher education programs is far less selective than to full-time ones. According to government statistics, in 2016 there were 2.23 applications per place in extramural programs as compared to 6.77 in full-time programs across public universities and 1.26 and 2.76 in private ones, respectively [Cherednichenko 2018:255]. Low selectivity is a critical factor of choosing this mode of study for some consumer groups. Candidates for extramural HEIs programs differ essentially from those applying for full-time programs in the level of educational attainment. Government statistics indicate that full-time program candidates are largely—about 90% from 2000 through 2016—represented by high school graduates, predominantly those who have just finished school [Cherednichenko 2018:261]. The distribution of extramural candidates by educational background according to the survey results is shown in Table 1. The majority (59%) hold certificates of vocational education mostly (49.9%) obtained in mid-level professional programs (MLPP), and only as few as 2.6% are graduates of skilled worker programs (SWP). High school graduates account for a significantly lower proportion of extramural enrollment (26.8%), most of them being graduates of regular secondary schools and 6.5% holding certificates of gymnasiums and lyceums. Among extramural students and graduates, 14.4% are pursuing a second HE degree—this is regulated by law, as getting another HEI degree in Russia is only possible within extramural programs.

There are also differences in the educational paths that bring students and graduates to extramural HE programs. Nearly all the respondents fall into four major tracks defined as different combinations of school education and any other type of pre-HE training. Three of the four tracks are of comparable size: “middle school to vocational” (27.8% of all extramural students and graduates), “high school to vocational” (31.1%) and “high school” (26.3%). About half of candidates in track 3 were admitted to HEI the same year they graduated from school, and the other half did it later. The fourth track, “high school to 1st HE degree”, followed by those who obtain a degree (mostly full-time) immediately after high school and then apply for another one extramurally, is noticeably less popular, accounting for 13.6% of all extramural students and graduates. Only 2.2% of all the respondents do not fit into any of the four categories described.

The largest proportion of extramural students have completed a vocational school, which points to a popular bypass strategy for ac-

Table 1. **Educational background of extramural HE candidates** (%)

Level of educational attainment; mode of study	Percentage of sample
High school, gymnasium, lyceum; full-time	26.8
MLPP, full-time	49.9
MLPP, extramural	6.4
SWP in combination with secondary education	2.6
HE, full-time	11.1
HE, part-time/extramural	3.3
Total	100.0

N of respondents = 425.

cessing HE in Russia's education system (with some modifications introduced in 2017—see below) that allows slipping past the obligatory high-stakes testing of the more selective high school academic track. Sociological studies demonstrate that accessing HEI via vocational school is popular among middle school graduates from families of comparatively low socioeconomic backgrounds and cultural capital. Based on their perceptions of benefits, costs and risks, they choose the path that offers additional confidence in the labor market in the form of a MLPP certificate and, hence, an opportunity to get a HE degree [Alexandrov, Tenisheva, Savelyeva 2015; Konstantinovskiy, Popova 2018]. The HSE's Monitoring of Education Markets and Organizations (MEMO) revealed that, apart from socially disadvantaged candidates, this strategy is also adopted by students from the most favorable backgrounds whose level of academic achievement is too low to succeed in the high school final test [Kosyakova et al. 2016:92, 95]. Presence of such students from well-educated families in the "middle school to vocational" track may explain some deviations in the general trends of characteristics observed across the four categories (see below). The "high school to vocational" track is another version of accessing HE via vocational school. About half of students in this track apply for HEIs the same year they graduate from vocational school. It is highly probable that one of the reasons for making a detour like that is the opportunity to submit a certificate of vocational training instead of low USE[3] scores when applying to HEIs.

Some changes were made to HEIs admission rules for candidates with MLPP certificates in 2017. From then on, such candidates

[3] Unified State Exam

Table 2. **Socioeconomic family background characteristics of extramural students and graduates in different educational tracks** (%)

Pre-HE educational track	Percentage of HE-educated mothers	Percentage of blue-collar father	Percentage of families with incomes lower/ higher than average
Middle school to vocational	27.5	67.0	48/15
High school to vocational	26.2	69.7	45/13
High school	37.5	57.5	42/18
High school to 1st HE degree	43.1	43.1	39/24

N of respondents = 425.

can be admitted based on either USE scores or the results of internal admission tests administered by the HEI, faculty or department—most often, at candidate's discretion. As the percentage of same-year MLPP graduates among accepted HEIs students remained at the level of 11% between 2014 and 2018, according to government statistics [HSE2020:58], it can be safely stated that the reform has not affected the strategy of accessing HE via vocational school significantly. Extramural candidates' behavior has been affected to an even lesser degree, considering that competition for admission to extramural programs is lower than to full-time ones, and extramural candidates rarely apply to top-ranking universities.

Let us now dwell on correlations between extramural students' background and their choice of educational trajectory. Table 2 shows a number of sociocultural and economic background characteristics of extramural students' and graduates' parents at the time of their graduation from secondary school.

In the order the four trajectories are listed, we generally observe an increase in the percentage of HE-educated mothers (from 26.2 to 43.1%) and that of families with incomes higher than average (from 13 to 24%) and a decrease in the percentage of blue-collar fathers (from 69.7 to 43.1%) and that of families with incomes lower than average (from 48 to 39%). The "middle school to vocational" track stands somewhat out, probably due to the heterogeneous sociocultural composition of students in this category, featuring representatives of disadvantaged social groups as well as those from highly resourceful families.

The order in which the four tracks are given in Table 2 represents a certain hierarchy illustrating, through the example of extramural study, the well-known correlation between academic achievement and socioeconomic status of parents. Theory of primary and secondary effects of social background has been widely used by international research-

ers and some experts in Russia [Bessudnov, Malik 2016; Kosyakova et al. 2016; Khavenson, Chirkina 2019] for analyzing this correlation, which is largely interpreted as reproduction of social inequality in education. Primary effects of social background are generally believed to manifest themselves in inequality of educational attainment, while secondary effects add to inequality of educational trajectories unrelated to differences in attainment. Available empirical findings do not allow drawing a clear line of demarcation between primary and secondary effects but do indicate a cumulative impact of parental education, social status and financial standing on both performance and educational choices of students. On the one hand, academic attainment improves from the first to the fourth track, as evidenced by increasing competitiveness: (i) better performance in middle school allows students to proceed to high school (track 2) instead of dropping out after the 9th grade (track 1); (ii) better performance in high school allows them to enroll in an extramural HE program (track 3) instead of going to a vocational school (track 2); (iii) excellent performance in high school leads to pursuing a first (mostly full-time) HE degree (track 4). On the other hand, this hierarchy is structured from lower to higher levels and types of training and captures the increase in educational capital accumulated prior to engaging in extramural study, thus reflecting the secondary effects of social background on inequality in education as well. Such secondary effects become obvious when their influence is reproduced at subsequent stages of extramural students' and graduates' educational trajectories.

3.3. Further Educational Trajectories

Table 3 shows the relationship between the type of pre-HE educational track and the ranking of HEI chosen for pursuing an extramural program. Higher position of the track in the hierarchy identified above correlates with a higher percentage of its followers (increasing from 6.1% in track 1 to 22.4% in track 4) admitted to the best-reputed HEIs ranked among the top 50 of RAEX-100[4] and a lower percentage of those who enroll in colleges unranked in RAEX-100. There is a minor deviation from the general trend though, particularly an increased proportion (15.8%) of track 1 representatives in HEIs ranked in the lower half of RAEX-100 and, consequently, a somewhat reduced percentage of such students in HEIs unranked. This is where we probably observe, again, the effects of using the bypass strategy of accessing HE via vocational school by two social groups that differ in size and socioeconomic backgrounds. Perhaps, this is where the more socially advan-

[4] RAEX Analytics rating agencies have produced annual rankings of Russian colleges since 2012, using statistical indicators and data from surveys of 30,000 respondents including teaching and academic staff, HE students and graduates, and employers. This study uses data of the 2018 rankings: https://lugasoft.ru/ok/okz/2014; https://lugasoft.ru/ok/okved/2014; http://www.edu.ru/abitur/act.9/index.php?rating/rating-2018.html

Table 3. **HEIs ranking: positions relative to the RAEX-100**

Pre-HE educational track	Top 100		Unranked	Total
	1–50	51–100		
1. Middle school to vocational	6.1	15.8	78.0	100
2. High school to vocational	11.4	8.3	79.6	100
3. High school	14.3	9.8	75.1	100
4. High school to 1st HE degree	22.4	10.3	67.2	100

N of respondents=425.

taged representatives of the "middle school to vocational" track can convert the benefits of their socioeconomic status into a slightly more frequent choice of prestigious HEIs ranked in the Top 100, on the one hand; on the other hand though, they can only access HEIs ranked 51st to 100th as a result of their low academic achievement.

Half of students and graduates in track 1, slightly less than half of those in track 2 and slightly more than half of those in track 3 enroll in extramural HE programs the same year that they graduate from a previous educational institution, and about one sixth of the sample do it within two years after graduation. That is, approximately two thirds of the respondents chose to engage in extramural study to keep their educational trajectories uninterrupted until they obtained a HE degree. Track 1 and 2 students and graduates, i. e. those with certificates of vocational schools, mostly selected the "I had to start working" option to explain their choice. The incidence of this motive among vocational school graduates is higher than the sample's average. Track 3 representatives are much less likely to mention that factor, instead referring to their low competitiveness more often than others, although this latter motive also appears to be relatively significant for track 2 students and graduates as well. Only one in ten students and graduates in tracks 1 and 2 had no employment when starting their extramural studies, while the percentage among high school graduates (track 3) exceeds one third. Obviously, followers of tracks 1 and 2 choose to combine work and study deliberately, whereas track 3 students have to do it as a result of the forced choice in favor of a lower competition for admission. Track 4 stands out essentially, with only one third of followers applying for extramural programs right after getting their first HE degree. Nearly half of them pursue Master's degrees, while representatives of other tracks are mostly enrolled in Bachelor's and Specialist's programs.

Therefore, the survey results confirm, on a new empirical material, the major findings obtained so far in research on secondary and vocational school students' educational trajectories [Alexandrov, Teni-

sheva, Savelyeva 2015; Kosyakova et al. 2016; Yastrebov, Kosyakova, Kurakin 2018], specifically the bypass strategy of accessing higher education via vocational school pursued by a number of social groups and low-performing students, socioeconomic status as a critical factor affecting educational trajectory at every stage of education, and social advantages and disadvantages determining the start of an educational trajectory and preserving some of their influence throughout subsequent educational stages.

4. Changes to Position in the Labor Market

4.1. Expectations and Reality

All extramural students and graduates seek to improve their position in the labor market, regardless of whether they enter a HEI the same year they graduate from a previous institution (46.7% of students and 50.2% of graduates) or later. To compare expectations and outcomes, we analyze perceived potential effects of extramural study on students' position in the labor market and feedback obtained from graduates with some post-graduation work experience[5]. Table 4 displays the distribution of students' answers to question, "How the extramural education that you receive will be useful for you?", and Table 5 shows the distribution of graduates' answers as to how their extramural degree has actually improved their position in the labor market. Students were free to select up to three answers from the list suggested, so percentages of total respondents who selected each answer add up to more than 100%. Graduates were asked to choose between 'Yes' and 'No" on every item, Table 5 showing percentages of those who answered 'Yes" on each specific item.

The widest gap between expectations and reality is observed in the incidence of reporting no returns on the degree obtained. Only 5.7% of the respondents believed at the beginning of their study that they would not benefit at all from their extramural HE degree, whereas 42.3% of extramural graduates complain the education they received has not improved their position at work or in the labor market in any way. Expected value of promotion is perceived as higher than that of better working conditions, students being much more likely to seek promotion in general ("Take a position that requires a college degree"— 53.8%, "Succeed in the labor market in general"—32.5%) than achieve any specific goals ("Get the job I want", "Start a business of my own", "Protect myself against being fired"— 27.4, 20.8 and 6.6%, respectively). Assessing the actual outcomes of training obtained, graduates tend to mention legitimation of their employment or labor market positions ("Improved my labor market position in general", "Legitimized my right to hold my current position"—55.9 and 49.3%, respectively) more often than specific career improve-

[5] Among the extramural graduates surveyed, 32.9% had 1 to 6 years of post-graduation work experience, 42.7% had 7 to 12, and 24.4% had 13 to 19 years of experience.

Table 4. **"How the extramural education that you receive will be useful for you?"** (percentages of total respondents)

Students' expectations	%
Take a position that requires a HE degree	53.8
Succeed in the labor market in general	32.5
Get promoted at my current employer	32.1
Get a better job / the job I want	27.4
Compete with full-time HE graduates for employment on equal terms	23.1
Start a business of my own	20.8
Protect myself against getting fired or laid off	6.6
Will not affect anything	5.7

No of respondents=212.

Table 5. **"In what ways has your extramural HE degree improved your position at work or in the labor market?"** (percentages of graduates who answered 'Yes')

Graduates' assessments	%
It hasn't	42.3
Improved my labor market position in general	55.9
Legitimized my right to hold my current position	49.3
Helped me find a new job that requires a HE degree	46.5
Legitimized my right to be paid my current salary	42.7
Helped me find a new job matching my acquired specialty	40.8
Got me a pay rise	39.9
Helped me get a job promotion	38.5
I got promoted as a result of getting a new job	35.7

N of respondents=213.

ments (pay rise-39.9%, job promotion-38.5%, promotion as a result of finding a new job-35.7%). In their assessments, general improvements ("Improved my labor market position in general"—55.9%) prevail over specific ones ("Legitimized my right to hold my current position"—49.3%; "Got me a pay rise"—39.9%). Finding a new job that requires a HE degree is reported somewhat more often (46.5%) than finding a new job matching the acquired specialty (40.8%).

Table 6. **Status of extramural graduates at HEI entry and at the survey** (%)

	At HEI entry	At the survey
Leaders	1.9	14.6
Highly skilled professionals	18.8	50.7
Mid-level professionals	29.1	6.6
Data entry and information processing workers, clerks	5.6	1.9
Sales, service and public utility workers	12.7	2.3
Skilled workers	10.8	3.3
Semiskilled workers	2.3	2.3
Unskilled workers	3.3	0.5
Other	3.3	4.7
Unemployed / No data	12.2	13.1
Total	100	100

* N of respondents=213.

As we can see, extramural students expect professional growth, promotion and better salaries from their prospective HE degree, but the real outcomes most often reported by graduates include improved position in the labor market and legitimization of the current position. Cases of promotion and professional growth are reported much less often by respondents with post-graduation work experience.

4.2. Changes to Status

Data on changes to the respondents' social and occupational status could be a better evidence of changes in graduates' employment positions. Respondents described their status by answering a series of open-ended questions with subsequent response coding. Table 6 displays two distributions of extramural graduates by social and occupational status—at HEI entry and at the survey, when most of them had been employed for a while after graduation.

Among graduates, the most dramatic change is observed in the percentage of individuals whose occupational status matches their HEIs qualifications, which increased 3.2 times to 65.3%. Highly skilled professionals account for 50.7% of this group (a 2.7-time increase), and leaders for 14.5% (the sharpest increase of 7.7 times). Obviously, the formal HE certificate requirement plays the most important role in accessing a leadership job. Percentages of leaders and highly skilled professionals increased at the expense of all other occupational levels, in particular mid-level professionals (a decrease from 29.1 to 6.6%) and skilled workers (from 10.8 to 3.3%), which indicates a change of

occupation upon obtaining a HE degree among graduates of mid-level professional programs, the most popular type of pre- HE education. The greatest reduction (from 12.7 to 2.3%) can be seen among sales and service workers, occupations that are fairly popular as first jobs. The percentage of semiskilled and unskilled workers remained low-5.6% at HEI entry and 2.8% at the survey. Therefore, 16.9% of extramural HE graduates in the sample have not succeeded in converting their HE degrees into qualifications-matching jobs. In addition, 13.1% of the graduates were unemployed at the survey or no data was available for them, and 4.7% were in the military or freelancers.

Of 65.3% extramural HE graduates employed as leaders and highly skilled professionals, 20.7% already had their current positions at HEI entry. However, only 8.0% had a first HE degree prior to enrolling in an extramural program—those in the "high school to 1st HE degree" track—while others were holding the positions of leaders and highly skilled professionals without the formal right to do so, so they enrolled in extramural HE programs to consolidate and legitimatize their positions.

In order to find out whether (and how, if it does) baseline status impacts the effectiveness of converting an extramural HE degree into a qualifications-matching job, we suggest estimating the percentage of extramural graduates holding leadership and highly skilled professional positions across different baseline statuses. The groups formed on the basis of baseline status differ in the percentage of individuals in the "Unemployed / No data" category. This will affect estimation accuracy to some extent, yet we will still be able to compare changes in the percentage of leaders and highly skilled professionals across the groups, which matters the most in this case. As the results show, positions matching extramural HE degree qualifications are held by 89% of graduates who were highly skilled professionals at entry (no data for 5%), 73% of those who started as mid-level professionals (no data for 13%) and 56% of the respondents who were employed as service, sales or blue-collar workers at the baseline, treated as a single group (no data for 13%). The fact that the most favorable positions in the labor market are held by those who chose to access HEI via vocational school confirms "feasibility" of the strategy initially designed to achieve two goals—access higher education and ensure a guarantee of a relatively in-demand job. Work experience gained at such positions, combined with HE training, contributes to professional growth and promotion. Those who had "weaker" employment positions at the baseline find it harder to convert their extramural HEIs degrees into degree-matching statuses.

In full conformity to cultural capital theory, students from families with no HE experience are much more likely to find themselves socially disadvantaged. Low awareness in this domain results in an inability to evaluate properly the differences among HEIs, analyze the labor market prospects offered by different institutions, compare different

programs, majors, modes of study, etc. Consequently, first-generation HE students often select majors, programs or departments of low quality or offering no good employment prospects. The existence of such low-quality majors and programs in higher education is an inevitable outcome of market mechanisms responding to the growing demand for HEIs degrees.

The previously revealed trend of social advantages and disadvantages that determine the start of an educational trajectory being partially preserved and extended into subsequent educational stages is thus applicable to further educational and career trajectories, too.

5. Conclusion

There are two major categories of extramural higher education program consumers. The first one is represented by young people determined to keep their educational trajectories uninterrupted until they obtain a HE degree. They use specific strategies to avoid submitting USE scores for admission and engage in intermediary vocational training instead to secure themselves an employment and/or to overcome the limitations imposed by their low competitiveness. Students in the second category enroll in extramural HEIs programs with two or more years of work experience; they are less numerous and use extramural study to satisfy their need for mobility and/or stability in the labor market.

Extramural degrees are mostly pursued by students from relatively low cultural and socioeconomic backgrounds. They differ in the size of their educational capital at HEI entry, and their differences are manifested in four types of educational tracks preceding admission to HEI. The four types of tracks make up a hierarchy that mirrors the hierarchy of cultural and socioeconomic statuses of extramural students' parents. The advantages and disadvantages of baseline educational background across the four tracks are preserved to a certain extent and translate into qualitative characteristics of education obtained in HEIs.

Differences in social and occupational positions at HEI entry, associated with educational background, impact the effectiveness of converting an obtained degree into a high-status labor market position matching the degree qualifications. Subgroups that possess better educational and status resources at baseline get an advantage here. Successful conversion of extramural HE degrees into social and occupational statuses is much more typical of those who needed their degree to get promoted to a leadership position or legitimate such position in case they were already holding one. This group is followed on the success scale by those who sought to change their mid-level professional jobs for highly skilled professional and leadership ones. Students who wanted a degree to get promoted from positions of blue-collar, service, sales and clerical workers are in the least

advantageous situation, their success rate being lower than the sample's average.

Therefore, extramural study contributes a lot to democratization of higher education, making it accessible to students from relatively low socioeconomic and cultural backgrounds. However, those who start off from less advantaged positions sometimes do not obtain the desired effects from HEIs degrees that they overwhelmingly seek in expectation of better salary opportunities in the labor market.

Socioeconomic advantages that most consumers of extramural higher education gain as a result of increasing their educational capital are crucial beyond doubt. Additionally, education has positive effects on personality development and social behavior and a number of other indirect effects, which is left beyond the scope of this study but nevertheless unquestionable. This study was aimed at shedding light on a number of social conflicts in extramural higher education. Designed to provide access to higher education for those who cannot afford being unemployed while studying, extramural programs become a platform for implementing bypass HE access strategies (alternative to the conventional "high school to higher education" academic track) by low-competitive candidates. Extramural HEIs programs perform the important function of democratizing the student composition in higher education, extending opportunity to students from low cultural and socioeconomic backgrounds, but extramural students and graduates cannot avoid falling under theory of cultural capital. As a result, the lower educational and social background at baseline, the less likely it is that obtaining a HE degree will improve the employment or labor market position. It is vital for the government, society and educational institutions to know the sociocultural characteristics of extramural HE students and take them into account when making deliberate efforts to ensure a high quality of human capital formed by extramural higher education.

References

Alexandrov D., Tenisheva K., Savelyeva S. (2015) Mobilnost bez riskov: obrazovatelnyy put «v universitet cherez kolledzh» [No-Risk Mobility: Through College to University]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 3, pp. 66–91. DOI: 10.17323/1814–9545–2015–3–66–91

Belyakov S., Klyachko T., Polushkina E. (2018) *Srednee professionalnoe obrazovanie: sostoyanie i prognoz razvitiya* [Vocational Education: Current Status and Future Projections], Moscow: Delo.

Bessudnov A., Malik V. (2016) Sotsialno-ekonomicheskoe i gendernoe neravenstvo pri vybore obrazovatelnoy traektorii posle okonchaniya 9-go klassa sredney shkoly [Socio-Economic and Gender Inequalities in Educational Trajectories upon Completion of Lower Secondary Education in Russia]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 1, pp. 135–167. DOI: 10.17323/1814–9545–2016–1–135–167

Cherednichenko G. (2014) *Obrazovatelnye i professionalnye traektorii rossiyskoy molodezhi (na materialakh sotsiologicheskikh issledovaniy)* [Educational and

Career Trajectories of Russian Youth (Based on Sociological Research)], Moscow: Center of Social Forecasting and Marketing.

Cherednichenko G. (2018) Zaochnaya forma polucheniya vysshego obrazovaniya v sravnenii s ochnoy (na materialakh statistiki RF) [Distance Learning as Compared to Full-Time Programs in Higher Education (Based on Russia's Official Statistics)]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 2, pp. 254–282. DOI: 10.17323/1814–9545–2018–2–254–282

Cherednichenko G. (2019) «Zaochnik» vysshey shkoly: ucheba i posle vypuska [Part-Time Students of Higher Education: Study and after Graduation]. *Sotsiologicheskaya nauka i sotsialnaya praktika / Sociological Science and Social Practice,* vol. 7, no 2, pp. 46–64. DOI: 10.19181/snsp.2019.7.2.6409

Donetskaya S., Dovgal S. (2018) Prodvizhenie vypusknikov na rynke truda i otslezhivanie ikh trudoustroistva: opyt universiteta [Graduates' Promotion on Labor Market and Tracking Their Career: The Experience of Novosibirsk State University]. *Vysshee obrazovanie v Rossii / Higher Education in Russia*, no 4, pp. 93–100.

Kliucharev G. (2015) «Razryv» obrazovaniya i rynka truda: mneniya ekspertov ["Rupture" of Education and Labor Market: Experts' Opinions]. *Sotsiologicheskie issledovaniya / Sociological Studies*, no 11, pp. 49–56.

Klyachko T. (2016) Vysshee obrazovanie: bolshe, luchshe, deshevle? [Higher Education: More, Better, Cheaper?]. *Demoscope Weekly*, nos 669–670. Available at: http://www.demoscope.ru/weekly/2016/0669/index.php (accessed 10 July 2020).

Konstantinovskiy D. (1999) *Dinamika neravenstva. Rossiyskaya molodezh v menyayushchemsya obshchestve: orientatsii i puti v sfere obrazovaniya (ot 1960-kh godov k 2000-mu)* [Inequality Dynamics. Russian Youths in a Changing Society: Educational Orientations and Pathways (from the 1960s to 2000s)], Moscow: Editorial URSS.

Konstantinovskiy D., Abramova M., Voznesenskaya E. et al. (2015) *Novye smysly v obrazovatelnykh strategiyakh molodezhi: 50 let issledovaniya* [New Meanings in Educational Strategies of Youth: 50 Years of Research]. Moscow: Social Forecasting and Marketing Center.

Konstantinovskiy D., Voznesenskaya E., Cherednichenko G., Hohlushkina F. (2011) *Obrazovanie i zhiznennye traektorii molodezhi: 1998–2008 gg.* [Education and Life Trajectories of Youth: 1998–2008 Years]. Moscow: Institute of Sociology of the Russian Academy of Sciences.

Konstantinovskiy D., Voznesenskaya E., Cherednichenko G. (2014) *Molodezh Rossii na rubezhe XX–XXI vekov: obrazovanie, trud, sotsialnoe samochuvstvie* [Russian Youth at the Turn of XX–XXI Centuries: Education, Employment, Social Well-being]. Moscow: Social Forecasting and Marketing Center.

Konstantinovskiy D., Popova E. (2015) Molodezh, rynok truda i ekspansiya vysshego obrazovaniya [Youth, Labor Market and Expansion of Higher Education].]. *Sotsiologicheskie issledovaniya / Sociological Studies*, no 11, pp. 37–48.

Konstantinovskiy D., Popova E. (2018) Rossiyskoe srednee professionalnoe obrazovanie: vostrebovannost i spetsifika vybora [Russian Secondary Professional Education: Demand and Specificity of Choice]. *Sotsiologicheskie issledovaniya / Sociological Studies*, no 3, pp. 34–44. DOI: 10.7868/S0132162518030030

Kosyakova Yu., Kurakin D. (2016) Imeyut li znachenie instituty? Professionalnaya gendernaya segregatsiya na etape vykhoda na rynok truda v sovetskoy i postsovetskoy Rossii [Do Institutions Matter? Occupational Gender Segregation at Labor Market Entry in Soviet and Post-Soviet Russia]. *Zhurnal Sotsiologii i Sotsialnoy Antropologii / The Journal of Sociology and Social Anthropology*, vol. XIX, no 5 (88), pp. 127–145.

Kosyakova Yu., Yastrebov G., Yanbarisova D., Kurakin D. (2016) Vosproizvodstvo sotsialnogo neravenstva v rossiyskoy obrazovatelnoy sisteme [The Reproduction of Social Inequality in the Russian Educational System]. *Zhurnal Sotsiologii i Sotsialnoy Antropologii / The Journal of Sociology and Social Anthropology*, vol. XIX, no 5 (88), pp. 77–79.

NRU HSE (2020) Indikatory obrazovaniya—2020: stat. sb. [Indicators of Education in the Russian Federation: 2020. Data Book], Moscow: NRU HSE. Sandler D., Sushchenko A., Kuznetsov P., Pechenkina T. (2018) Trudoustroystvo vypusknikov i ego svyaz s kachestvom vysshego obrazovaniya [Employment for University Graduates and Its Measure the Higher Education Quality]. *University Management: Practice and Analysis*, vol. 22, no 3 (115), pp. 73–85.

Khavenson T., Chirkina T. (2019) Obrazovatelnyy vybor uchashchikhsya posle 9-go i 11-go klassov: sravnenie pervichnykh i vtorichnykh effektov sotsialno-ekonomicheskogo polozheniya semji [Student Educational Choice after the 9th and 11th Grades: Comparing the Primary and Secondary Effects of Family Socioeconomic Status]. *Zhurnal issledovaniy sotsialnoy politiki / Journal of Social Policy Studies*, vol. 17, no 4, pp. 539–554.

Kharchenko I. (2008) *Sovremennaya molodezh Sibiri: obrazovatelnye i professionalnye strategii* [Modern Youths of Siberia: Educational and Career Strategies], Novosibirsk: Institute of Economics and Industrial Engineering, Siberian Branch of the Russian Academy of Sciences.

Yastrebov G., Kosyakova Y., Kurakin D. (2018) Slipping Past the Test: Heterogeneos Effects of Social Background in the Context of Inconsistent Selection Mechanisms in Higher Education. *Sociology of Education*, vol. 91, no 3, pp. 224–241.

Yushkina N. (2019) Vliyanie obrazovatelnykh traektoriy na formirovanie upravlencheskoy elity v rossiyskikh federalnykh organakh vlasti [Influence of Educational Trajectories on the Formation of the Managerial Elite in the Russian Federal Authorities]. *Vestnik universiteta*, no 11, pp. 176–183.

Zubok Yu.A., Chuprov V. I. (2015) Molodye spetsialisty: problemy podgotovki i polozhenie na rynke truda [Young Specialists, Training and the Situation in the Labor Market]. *Sotsiologicheskie issledovaniya / Sociological Studies*, no 5, pp. 114–122.

The Impact of Educational Indicators on Success in Afterschool Life

Regional Data-Based Analysis

M. Agranovich

Received in April 2020

Mark Agranovich
Candidate of Sciences in Economics, Director of the Research Center for Education Monitoring and Statistics, Federal Institute for the Development of Education, Russian Presidential Academy of National Economy and Public Administration (RANEPA). Address: Bld. 1, 9 Chernyakhovskogo St, 125319 Moscow, Russian Federation. Email: agranovich-ml@ranepa.ru

Abstract. The recent years have seen a growing interest in comparative research of regional education systems, driven by the opportunity to set new analitical goals as well as the education policy needs. Studies in this field predominantly focus on comparing the learning outcomes and equality of access to education across regions. This paper investigates the relationship between regional educational indicators and success of secondary graduates in afterschool life, the latter being measured as a percentage of the total number of people in the corresponding age group who are not in education, employment or training (NEET). Correlation analysis controls for the influence of external socioeconomic factors, such as gross regional product per capita and urbanization level, on educational indicators.
Correlation and regression analyses are applied to educational indicators, socioeconomic indicators and NEET rates across the regions of Russia. The NEET rate shows a statistically significant relationship with the indicators describing participation in education, organization of learning process, learning environments, resources and funding involved, and the teaching staff structure. A no less important finding is the evidence of no relationship between success of secondary graduates in afterschool life and a number of educational indicators playing an essential role in Russia's current education policy.
Data presented in this study may serve the basis for developing regional education policies; it should not be used for evaluating, let alone ranking, regional education systems.
Keywords: secondary education, secondary vocational education, educational indicators, regional education systems, NEET, correlation analysis.

DOI: 10.17323/1814-9545-2020-3-188-213

Translated from Russian by I. Zhuchkova.

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

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

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

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

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

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

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

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

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

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

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

1. Research on Regional Education Systems in Russia and Abroad

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2. Research Methodology, Tools and Data Sources

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

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

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

The following types of indicators were analyzed:

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

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

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

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

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

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

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

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

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

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

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

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

---

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

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

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

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

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

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

3. Key Findings

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

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

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

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

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

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

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

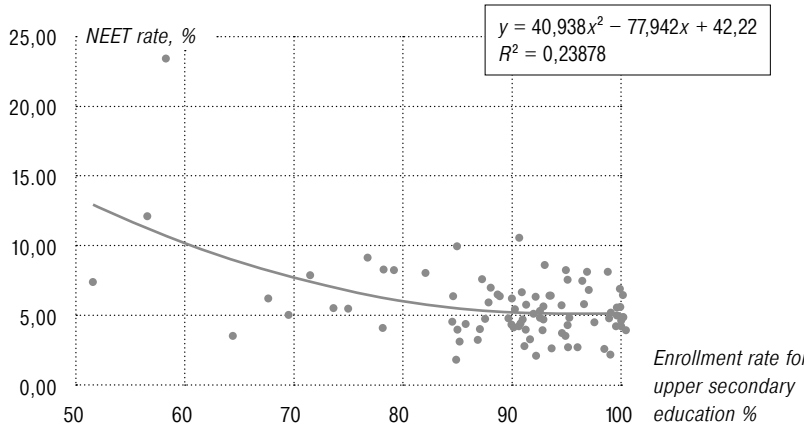
Table 1. **Correlations between educational indicators, on the one hand, and GRP per capita and urbanization rate, on the other hand**

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

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

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

Figure 1. **Correlation between participation in vocational programs at the level of upper secondary education and the NEET rate**



Source: Calculated based on data obtained from Rosstat and the Federal Service for Supervision in Education and Science

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

3.2. Education System Indicators and Success in Afterschool Life

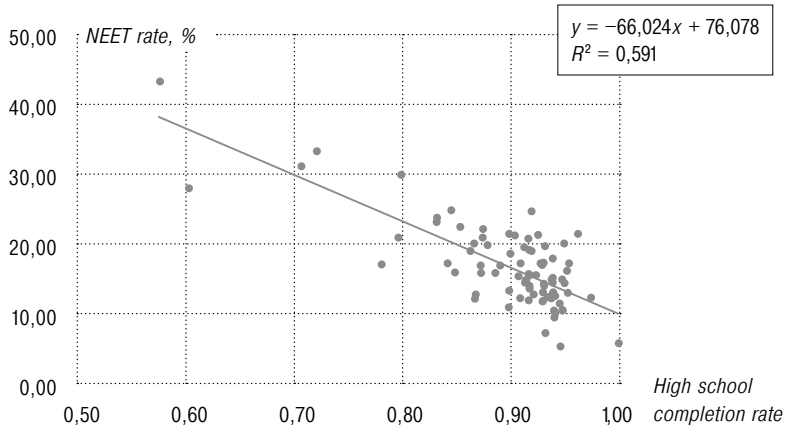
3.2.1. Participation in Education

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

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

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

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



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

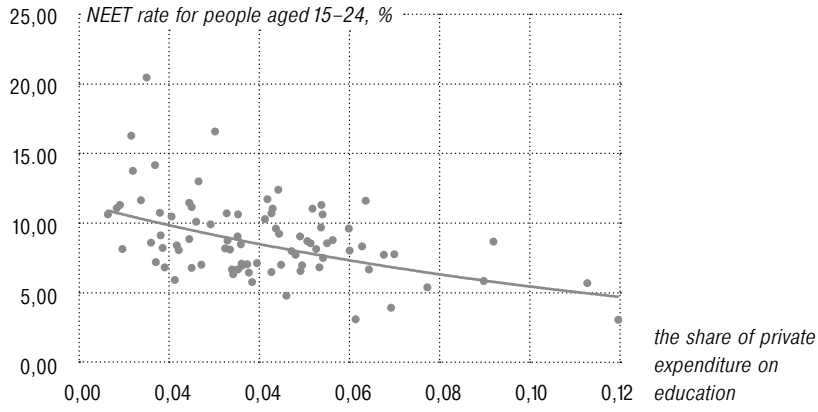
An important indicator of participation in education is the completion rate, which shows the percentage of students completing their programs successfully. The average completion rate for secondary education in Russia exceeds 90%, which is fairly high and above the OECD average (80%) [OECD2019]. At the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

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

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

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

Figure 3. **Correlation between the share of private expenditure on education and the NEET rate**



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

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

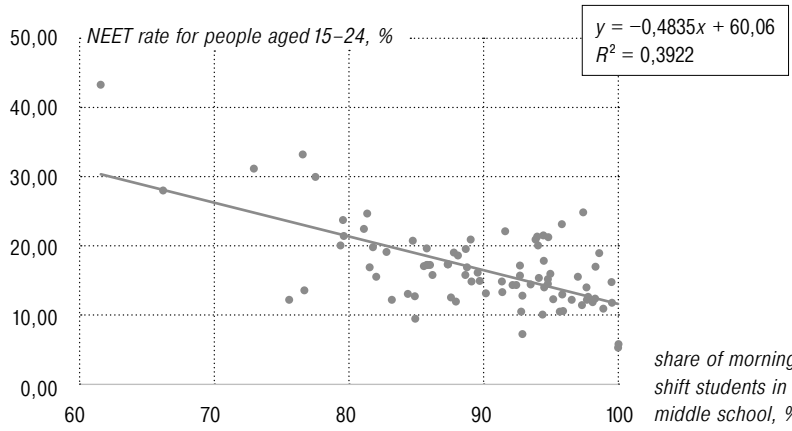
3.2.2. Education Spending

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

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

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

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



3.2.3. Organization of Learning Process

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

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

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

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

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

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

people aged 15–19 and r = –0.63, p < 0.001 for people aged 20–24 (Figure 4).

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

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

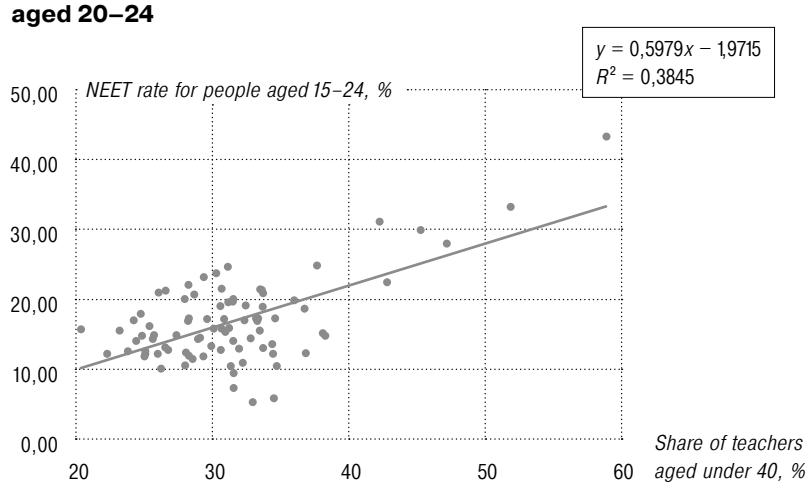
A statistically significant negative correlation was discovered between the level of subject specialization at upper secondary level and NEET rates for both age groups: r = –0.33, p < 0.001 and r = –0.41, p <0.001, respectively. It can therefore be concluded that subject-oriented and advanced learning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

3.2.4. The Structure of Teaching Staff and Teacher Working Conditions

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

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

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



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

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

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

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

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

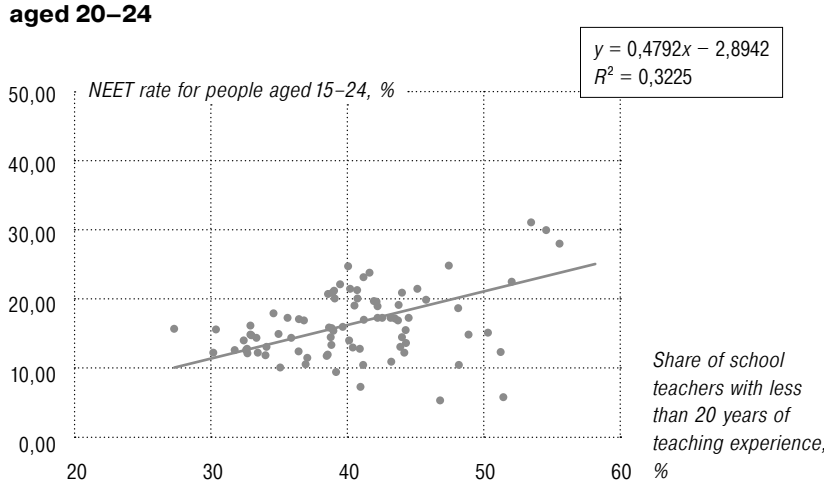
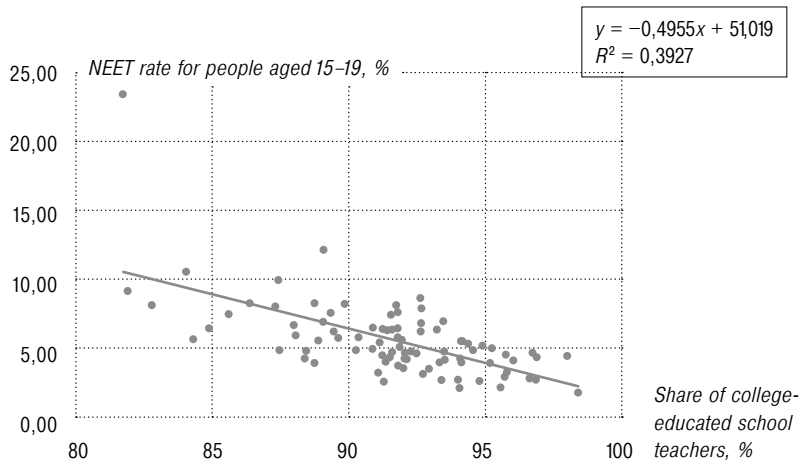


Figure 8. **Correlation between the share of college-educated school teachers and the NEET rate for people aged 15–19**



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

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

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

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

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

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

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

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

4. Conclusion

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

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

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

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

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

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

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

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

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

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

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

References

Agranovich M. (2019) Chto segodnya hotyat znat strany pro obrazovanie (novye napravleniya statisticheskikh issledovaniy OESR) [What Countries Want to Know about Education Today (New Dimensions of OECD Statistics]. Proceedings of *The 15th International Academic Conference "Trends in Education Development: The Quality of Learning Outcomes and the Educa-*

tion Reforms to Improve It" (Moscow, February 15–17, 2018), Moscow: Delo, pp. 77–87.

Agranovich M. (2019) Molodezh na rynke truda v stranakh OESR: mezhstranovoy sravnitelny analiz shansov na zanyatost [Young People in the Labour Market in OECD Countries: Across-Country Comparative Analysis of Employment Opportunities]. *Obrazovatelnaya politika*, no 1–2, pp. 96–115.

Agranovich M. (2019) Resursy v obrazovanii: nasyshchenie ili presyshchenie? [Educational Resources: Saturation or Satiety?]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 4, pp. 254–275.DOI: 10.17323/1814–9545–2019–4–254–275

Agranovich M. (2017) Indikatory dostizheniya tseley ustoychivogo razvitiya v sfere obrazovaniya i natsionalnaya obrazovatelnaya politika [Achievement Indicators for Sustainable Development Goals in Education and National Education Policies]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 4, pp. 242–264.DOI: 10.17323/1814–9545–2017–4–242–264

Agranovich M. (2014) Metodicheskie voprosy sravnitelnoy otsenki subnatsionalnykh obrasovatelnykh sistem [Methodical Issues of Comparative Assessment of Subnational Educational Systems]. *Social Science Research Network*. Printed June 24. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2457827 (accessed 20 July 2020).

Agranovich M., Ermachkova Y., Seliverstova I. (2019) *Rossiyskoe obrazovanie v kontekste mezhdunarodnykh indikatorov—2019. Analiticheskiy doklad* [Russian Education in the Context of Global Indicators—2019. Analytical Report], Moscow: Research Center for Education Monitoring and Statistics, Federal Institute for the Development of Education, RANEPA.

Castello A., Domenech R. (2002) Human Capital Inequality and Economic Growth: Some New Evidence. *Economic Journal*, vol. 112, March, pp. 187–200.

Filipova A. G., Vysockaya A. V. (2018) Issledovanie system obshchego srednego obrazovaniya v regionakh Rossii: metod «serogo yashchika» [Studying General Secondary Education Systems in the Regions of Russia: The 'Gray Box' Method]. *Regionologiya Regionology*, vol. 26, no 1 (102), pp. 155–178.

Groof de J., Yankelevich S. (eds) (2019) *Upravlenie sistemoy obrazovaniya na raznykh urovnyakh: vertikal vlasti, transfer polnomochiy i regionalnoe sotrudnichestvo* [Education Management at Different Levels: Top-Down Governance, Transfer of Authority, and Cross-Regional Cooperation], Moscow: NRU HSE.

Nusche D., Laveault D., MacBeath J., Santiago P. (2010) *OECD Review on Evaluation and Assessment Frameworks for Improving School Outcomes: New Zealand*. Available at: http://www.oecd.org/education/school/49681441.pdf (accessed 20 July 2020).

OECD (2019) *Education at a Glance 2019*. Paris: OECD.

OECD (2016) *Education at a Glance 2016*. Paris: OECD.

Pérez-Gómez R., Aragón-Velasco A. (2016) Evaluating Regional Education Systems Performances in Spain and their Influence in the Socioeconomic System. A Geomatic Approach. Proceedings of *The 6th International Conference on Cartography and GIS (Albena, Bulgaria, 13–17 June 2016)*, pp. 32–42.

Rosstat (2019) *Regiony Rossii. Sotsialno-ekonomicheskie pokazateli—2019: Stat. sb*. [Socioeconomic Indicators 2019: Statistical Book], Moscow: Rosstat.

Santiago P., Donaldson G., Looney A., Nusche D. (2012) *OECD Reviews of Evaluation and Assessment in Education: Portugal.* Available at: http://www.oecd.org/education/school/50077677.pdf (accessed 20 July 2020).

Sauer P., Zagler M. (2014) *(In)equality in Education and Economic Development. Viena University of Economics and Business. Department of Economics Working Paper No 163*.

Shabunova A., Golovchin M. (2012) Otsenka razvitiya obrazovaniya v munitsipalnykh territoriyakh [Evaluation of Education Development in Municipal Territories]. *Problems of Territory's Development,* iss. 1 (57), pp. 91–99.

The UNESCO Institute for Statistics (2013) *Mezhdunarodnaya standartnaya klassifikatsiya obrazovaniya* [The International Standard Classification of Education (ISCED2011)]. Available at: https://nic.gov.ru/Media/Default/Documents%20Files/isced-2011-ru.pdf (accessed 20 July 2020).

Tomul E. (2009) Measuring Regional Inequality of Education in Turkey: An Evaluation by Gini Index. *Procedia—Social and Behavioral Sciences*, vol. 1, no 1, pp. 949–952.

Vinod T., Yan W., Xibo F. (2001) *Measuring Education Inequality. Gini Coefficients of Education. The World Bank Policy Research Working Paper No 2525*.

Zakhir Yu. (2015) Munitsipalnye sistemy obrazovaniya kak object otsenki kachestva obrazovaniya: normativny i metodicheskiy aspekty [Municipal Education Systems as an Object of Education Quality Assessment: Legislative and Standard Legal Aspects]. *Kachestvo obrazovaniya v Evrazii / Education Quality in Eurasia*, no 3, pp. 75–88.

Zudina A. (2018) Dorogi, vedushchie molodezh v NEET: sluchaj Rossii [The Pathways that Lead Youth in NEET: The Case of Russia]. *HSE Economic Journal*, vol. 22, no 2, pp. 197–227.

Organizational Cultures of Vocational Schools and Firms in Russia, China and Iran as Perceived by Students and Teachers

L. Zakharova, L. Shilova, Z. Gadbedji, Zhu L.

Received in April 2020

Lyudmila Zakharova
Doctor of Sciences in Psychology, Professor, Head of the Department of Psychology of Management, Faculty of Social Sciences, National Research University Lobachevsky State University of Nizhny Novgorod. Email: zlnnnov@mail.ru

Lyudmila Shilova
Candidate of Sciences in Pedagogy, Associate Professor, Department of Psychology of Management, Faculty of Social Sciences, National Research University Lobachevsky State University of Nizhny Novgorod. Email: shinila@yadex.ru

Zahra Gadbedji
postgraduate student, Department of Psychology of Management, Faculty of Social Sciences, National Research University Lobachevsky State University of Nizhny Novgorod. Email: z.ghadbeigi@gmail.com

Zhu Liuchuan
Master's degree student, Department of Psychology of Management, Faculty of Social Sciences, National Research University Lobachevsky State University of Nizhny Novgorod. Email: 1204003453@qq.com

Address: 23 Gagarina Ave, 603022 Nizhny Novgorod, Russian Federation.

Translated from Russian by I. Zhuchkova.

Abstract. This study examines the problems of getting vocational students ready for modern innovative work environments and ensuring their organizational socialization within the changing technological paradigm. Research methodology was based on the organizational culture framework proposed by Kim S. Cameron and Robert E. Quinn. A survey was conducted to find out how vocational students and teachers in Russia, China and Iran perceived the organizational cultures of vocational schools, firms envisaged as the most probable employers, and firms that could be the most effective under the existing conditions. Organizational structure of vocational schools was found to be related to the socioeconomic situation in the country. The most well-balanced examples were observed in Chinese vocational schools, where students were convinced that they would be working for effective companies. Students and teachers in China are united in their assessments and want everything to stay as it is. In the long run, such attitudes may result in stagnation rather than development. Russian students believe that their vocational schools have a clan culture and would like to strengthen the clan component at the expense of hierarchy. They tend to overestimate the innovativeness component and disregard it largely, being convinced that they will most probably work for an ineffective organization. Teachers see hierarchy as a dominant culture in the existing situation and want to weaken it along with mar-

ket and strengthen a clan-type culture instead as much as possible. Such attitudes will naturally result in a lower quality of human capital. Vocational teachers in Russia have a quite clear understanding of effective organizational cultures, yet they exert no relevant socializing influence on students and even agree with them on preferring the dominance of clan values. In Iran, vocational students assess the culture of effective businesses more adequately than teachers, while the latter seek to preserve the unquestioned prevalence of hierarchical values and minimize the innovative ones, which prevents anticipatory organizational socialization in vocational education. Limitations of the study are discussed, and approaches to developing organizational socialization programs are worked out.
Keywords: Industry 4.0, vocational schools, students, teachers, organizational culture, values, innovations, organizational socialization.

DOI: 10.17323/1814-9545-2020-3-234-254

According to Russia's Ministry of Economic Development's projections for up to 2036, the situation in Russia's labor market will be driven by economic development in the context of transition to an innovative economy as well as by integration of innovation, technology and new communication formats[1]. In the Global Innovation Index 2019, Russia was ranked 46th (as compared to 45th in 2017)[2]. A good deal of effort will be required to bring the Russian economy to a sustainable innovative development. Meanwhile, OECD experts expect Russia's economic growth in the upcoming years to be rather moderate and below the global average. Low labor productivity induced by low levels of innovative capacity of many Russian organizations was mentioned as one of the most powerful factors inhibiting economic growth [OECD2017].

Socioeconomic transformations associated with the advent of Industry 4.0 are more rapid than those faced by economies in earlier periods and require a higher level of flexibility and proactive adaptation of all socioeconomic institutions, including vocational schools. The new economic context brings fundamental changes to the labor market, introducing new forms of employment, driving out familiar occupations and giving rise to new ones [Fossen, Sorgner 2019]. Employee requirements are being changed, too. Readiness to innovation, both in technology and management, is a key mental characteristic demanded from employees in Industry 4.0. The new economy wants workers who are responsible, resourceful and personally involved, who can de-

[1] Ministry of Economic Development of the Russian Federation. Projecting the Socioeconomic Development of the Russian Federation for up to 2036: http://economy.gov.ru/wps/wcm/connect/9e711dab-fec8–4623-a3b1–33060a39859d/prognoz2036.pdf? MOD=AJPERES&CACHEID=9e711dab-fec8–4623-a3b1–33060a39859d

[2] Dutta S., Lanvin B., Wunsch-Vincent S. (eds.) (2019) *Global Innovation Index 2019. Cornell SC Johnson College of Business.* Available at: https://www.globalinnovationindex.org/gii-2019-report

velop together with the working process and assume responsibility for their learning and professional development [Kalendzhyan, Kuzmina 2017; Kvachev, Yudina 2017]. Such qualities hinge upon commitment to innovation, but employees in Russian businesses still largely share values of the past rather than the future [Temnitsky 2014; Zakharova, Leonova, Korobeynikova 2017; Vnutskikh, Komarov 2019].

Readiness for change, innovation and creativity have been traditionally associated with the young age. However, modern Western employers tend to be reluctant to hire young people as long as they can find someone who is older and more experienced. Stereotypes of ageing are giving way to negative stereotypes about youths, who are believed to be incompetent, disengaged, inactive and relying too much on social networks [Bowman 2014]. The young generation is believed to be unable to stay focused for a long time; they are oriented toward personal growth in a comfortable work environment with a flexible schedule and a famous brand; they are inward-looking; they want no career growth, a liberal workplace, a flat organization and a lot of incentives [Brazhnikov 2016; Kucherov, Zamulin, Tsybova 2019]. Clearly, employers are unhappy with this portrait of a young worker, especially in organizations with great distances between managerial levels, standardized operating procedures and strict liability requirements.

Unemployment rate among vocational training graduates in Russia is nearly 1.5 times higher than the national average, about 70% of them being mismatched to their jobs, largely overeducated and underpaid [Dudyrev, Romanova, Travkin 2019:131]. Experts associate employment and organizational socialization issues experienced by vocational school graduates with insufficient internship hours in learning programs. In Russia's present-day model of transition from study to work, successful placement of vocational graduates implies combination of work and study and active cooperation between vocational schools and employers to allow students to have paid part-time jobs as part of their learning programs [Ibid.:129, 131].

Because there is strong statistical evidence confirming the high significance of combining work and study for future careers of vocational students, it probably makes sense to look at companies in which internees learn their new trades and familiarize with work environments. Some Russian businesses have adjusted successfully to new digital technology, but there are still entire sectors whose technological and organizational cultures are "stuck in the past century"[3]. Research findings show that a large proportion of industrial workers in Russia have not yet adapted to market economy conditions—such as job uncertainty, instability of income as a function of qualifications

[3] Putin V. Nam nuzhna novaya ekonomika [We Need a New Economy]. *Vedomosti*. January 30, 2012. Available at: https://www.vedomosti.ru/politics/articles/2012/01/30/o_nashih_ekonomicheskih_zadachah

and employee contribution, and competition in the labor market—and still rely on government help [Temnitsky 2014:47].

There arises a legitimate question: what are the organizational cultures that vocational students are prepared for? The system of vocational education and training should provide effective organizational socialization of students so that they are ready to pave the way towards an innovative economy with their effort and involvement instead of adding to employee resistance to the ongoing innovative market reforms.

1. Organizational Socialization as a Prerequisite for Readiness to Work for a Modern Firm

Research on socialization as a process by which an adult individual learns the social norms and values and develops their personality has a long history [Giddens 2005]. However, no answers have been found to a number of questions that are key to providing effective socialization as a multivariate process that represents a hierarchically structured synthesis of such heterogeneous phenomena as culture, society and personality [Karpov, Perevozkina 2019].

In the late 1970s—early 1980s, Western scholars embarked on research into organizational socialization (OS) as a prerequisite for producing effective employees. Company's organizational culture was regarded as a framework for organizational socialization. Traditional social culture and lessons that employees learn from their prior socialization experience rarely contribute to a growing company's performance. The pioneering studies of John van Maanen and Edgar H. Schein, who formulated the main ideas of OS, show that productivity of any organization depends on how quickly its recruits learn the functional and social requirements of their new role as well as the behavioral patterns and styles appropriate for their position in the organization. Since the process of OS involves a transfer of information and values, it is based on internalizing the company's organizational culture [Van Maanen 1978; Van Maanen, Schein 1979].

Present-day researchers and practitioners elaborate various types, strategies and methods of OS and compare their efficiency. Some recent findings indicate that organizational socialization is contingent on the company's mission and strategic goals [Jaskyte 2005; Desmidt, Prinzie 2019]. The first studies on anticipatory socialization have been produced [Farag, Elias 2016; Fetherston 2017], showing that managers want to get employees who have already internalized the company's values and their functional role so as to reduce essentially the cost of newcomer fault and training. In Russia, where a number of firms experience difficulty transitioning to innovative market-oriented development and making relevant changes to their organizational cultures, organizational socialization could not be more urgent both as a factor of company performance [Dyrin 2006; Temnitsky 2014; Zakharova, Vlaskin, Orlova 2017] and as an objective for the system of vocational education [Dyrin et al. 2017].

As vocational graduates get employed, they enter a certain socio-psychological context, which is employer's organizational culture (OC). It is a manifestation of the company's organizational conditions based on the values shared by the majority of employees, i. e. their attitudes to the company's development and the relevant models of work and organizational behavior. Values are a strong predictor of behavior, so the value component of organizational socialization is of paramount importance [Zdravomyslov 1986; Scott, Herbst, Houmanfar 2009; Schwartz 2012]. Successful organizational adjustment of firms to the new digital era of Industry 4.0 suggests adopting a market-oriented hierarchical model of OC with strong adhocracy and clan components. Market orientation motivates employees to achieve success in a competitive environment; the hierarchical structure of OC in industrial settings ensures strict compliance to standardized operating procedures; adhocracy facilitates acceptance of innovations that keep the company viable and competitive; and the clan component provides the necessary level of humaneness in work environment [Zakharova, Leonova, Korobeynikova 2017]. Most institutions of vocational training pay considerable attention to student motivation and curriculum [Nagimova, Fakhretdinova 2019], while applying little conscious effort to prepare their students for organizational cultures of modern innovative firms.

Comparative analysis of organizational socialization in vocational schools across countries with different levels of economy innovation could be helpful for identifying the patterns of preparing vocational students to work for modern organizations in different socioeconomic and cultural contexts. China, for instance, is among the world's fastest-growing economies, innovation being its absolute priority. The country climbed from 22nd in 2017, through 17th in 2018, to 14th in 2019 in the Global Innovation Index[4]. Chinese firms use an array of effective tools to boost their own innovative performance [Zavyalova 2018]. Contrastingly, Iran is facing considerable hardships in terms of economic growth, its economy being dependent on oil revenues and suffering from a long-lasting sanction pressure. Iran has worked out and adopted an "economy of resistance" which largely resembles a wartime economy [Mamedova 2015]. The country is currently ranked 61st in Global Innovation Index. China and Iran thus choose different ways to enhance and accelerate their innovative development—the goal that they share with Russia. It could be expected that differences in socioeconomic and cultural situations will translate into differences in the quality of vocational education systems and their effectiveness in providing organizational socialization of students.

[4] Dutta S., Lanvin B., Wunsch-Vincent S. (eds.) (2019) *Global Innovation Index 2019*. Cornell SC Johnson College of Business. Available at: https://www.globalinnovationindex.org/gii-2019-report

This study seeks to compare organizational cultures of Russian, Chinese and Iranian vocational schools. Analysis of how teachers, who are the key agents of student socialization, and students themselves perceive the organizational cultures of effective companies will allow assessing vocational graduates' readiness to work for a modern firm and determining the specific objectives of anticipatory organizational socialization.

2. Research Design

2.1. Goal

This study was aimed at identifying the perceptions of vocational students and teachers in Russia, China and Iran about organizational cultures of firms—prospective employers of students—as a basis for developing organizational socialization programs.

The study was performed in 2019 as part of independent research and development initiatives administered by the Faculty of Social Sciences of Lobachevsky State University of Nizhny Novgorod.

2.2. Respondents

The sample consisted of 310 male students who had completed two years of vocational study and 92 teachers with at least two years of vocational teaching experience. Respondents from Russia, China and Iran are represented by equal proportions. The study involved nine vocational schools in Nizhny Novgorod, Nanning (Guangxi Zhuang Autonomous Region of China) and Tehran (Iran), three in each region. These cities have largely industrial profiles typical of their countries. Local vocational schools train industrial workers in mechanical engineering technology, operation and maintenance of electrical and electromechanical equipment. *Kardani* programs in Iran are similar to Russian and Chinese vocational programs in student age, educational objectives and curricula.

2.3. Methodology

Theoretical frameworks used in this study include Schein's theory of organizational culture, which posits that OC functions consist in external adaptation and internal integration [Van Maanen, Schein 1979], the conceptions of Andrey Zdravomyslov [1986] and Shalom H. Schwartz [Schwartz, 2012] about values as predictors of behavior, and the concept and typology of organizational cultures proposed by Kim S. Cameron and Robert E. Quinn [Cameron, Quinn 2011]. The latter distinguish among clan, adhocracy (innovative), market (business) and hierarchy (bureaucratic) cultures depending on which of the four respective values they are founded on. Clans prioritize stability of relationship, adhocracies—innovation and creative self-actualization, markets—success in a competitive environment, and hierarchies—formal rules, discipline and standardized operating procedures.

2.4. Method

A modified version of the Organizational Culture Assessment Instrument (OCAI) introduced by Cameron and Quinn [Cameron, Quinn 2011] was used to diagnose the organizational cultures of the voca-

tional schools and the OC preferences of teachers and students. The student questionnaire contained the following questions:

What kind of organization would you like to work for?

What kind of organization do you think you will most probably work for?

What kind of organization will be the most effective in the modern economic context?

How would you describe your vocational school right now?

What would you like your vocational school to be like?

The teacher questionnaire contained the following questions:

How would you describe your vocational school right now?

What would you like your vocational school to be like?

What kind of organization do you think your graduates will most probably work for?

What kind of organization will be the most effective in the modern economic context?

The non-parametric Mann–Whitney and Wilcoxon tests were used for statistical data analysis.

3. Organizational Cultures of Vocational Schools as Perceived by Students and Teachers

Organizational cultures of vocational schools differ essentially between the perceptions of students and teachers (Table 1).

In Russia, differences in OC perceptions between vocational students and teachers are centered around the clan and hierarchy components. Students perceive the organizational culture of their school as a clan, while teachers believe it to be more of a hierarchy. Teachers place emphasis on compliance with the curriculum, various instructions and performance standards, which grow in number from year to year; they are strict and demanding with students—who, in their turn, are convinced that everything is negotiable and they can always find an excuse or a reason to postpone a deadline. As in many organizational cultures of Russia, rigidity of rules is mitigated by the possibility of non-compliance. Teachers themselves would like to reduce the hierarchy component from 33 to 20% and strengthen the clan culture from 28 to 33%, desired changes being statistically significant in both cases ($p \leqslant 0.05$). The data obtained allows suggesting that vocational school teachers are oriented toward internal integration and want to achieve psychological safety and a subjectively comfortable organizational life by reducing bureaucracy and confrontation with students.

The survey participants—both teachers and students—appear to overestimate the adhocracy (innovativeness) component, rating the emphasis placed on it to be 23–24%. Meanwhile, adhocracy culture has been at the level of 14–15% in the majority of Russian organizations for many years, whereas managers would like it to be at least 26% [Zakharova, Leonova, Korobeynikova 2017:91–92]. Such assessments are very likely to indicate the respondents' desire to show the situation in their college in a favorable light. In general, students seem

Table 1. **Organizational cultures in Russian, Chinese and Iranian vocational schools and the OC preferences of students and teachers**

Vocational schools		Components of vocational school organizational culture											
		Clan			Adhocracy (Innovativeness)			Market (Business)			Hierarchy		
		O	D	W	O	D	W	O	D	W	O	D	W
Russia	Stud.	34	36	(–)	23	24	(–)	21	22	(–)	22	18	*
	Teach.	28	33	*	24	29	*	24	18	*	33	20	*
	U	*	*		(–)	*		T	*		*	_	
China	Stud.	27	27	(–)	22	23	(–)	26	25	(–)	26	25	(–)
	Teach.	27	27	(–)	22	22	(–)	25	24	(–)	26	27	(–)
	U	(–)	(–)		(–)	(–)		(–)	(–)		(–)	(–)	
Iran	Stud.	32	33	(–)	10	29	**	19	11	**	40	27	**
	Teach.	27	26	(–)	17	17	(–)	23	23	(–)	33	34	(–)
	U	*	**		*	**		*	**		*	*	
U RVS–CVS Stud.		*	**		(–)	(–)		*	*		*	*	
U RVS–IVS Stud.		(–)	T		*	*		(–)	*		*	*	
U CVS–IVS Stud.		*	*		*	*		*	*		*	(–)	
U RVS–CVS Teach.		(–)	*		T	*		*	*		*	*	
U RVS–IVS Teach.		(–)	*		**	*		T	*		(–)	**	
U CVS–IVS Teach.		(–)	(–)		**	*		T	(–)		*	*	

In Tables 1 and 2: *Stud.*—students, *Teach.*—teachers, *O*—observed emphasis on OC component, *D*—desired emphasis on OC component; *RVS*—indicators in Russian vocational schools, *CVS*—indicators in Chinese vocational schools, *IVS*—indicators in Iranian vocational schools; statistical significance of differences measured using *U*—Mann–Whitney test; *W*—Wilcoxon test.
*—$p \leqslant 0.05$; **—$p \leqslant 0.01$, T—trend; (–)— no statistically significant difference.

to attach little value to innovation. If they want any changes to their school's organizational culture at all, those should not affect the adhocracy component. Both teachers and students agree that hierarchy should be reduced and the clan component should be strengthened as much as possible, but teachers would also like to decrease essentially the market component and increase considerably the level of adhocracy.

It follows from the above that teachers are more likely to recognize the existing low level of innovativeness than students. At the same time, a decrease in the market component along with reduced hierarchy and intensified clan culture will naturally lead to degradation of

the quality of human capital created by vocational schools as a result of lower personal responsibility of students, higher levels of negligence to learning, operating rules and regulations, and pseudo-innovation generated by low requirements to objectivity of performance measures in a clan-driven culture. Organizational culture orientations of Russian vocational teachers and students provide ground for suggesting an urgent need to emphasize organizational socialization of students as part of educational programs in order to provide strict and full compliance to engineering operating procedures along with innovation readiness and removal of psychological barriers to new technology and management solutions.

Chinese vocational students and teachers are unanimous in their perceptions—no statistically significant difference is observed for any component of existing or preferred organizational culture. Moreover, organizational cultures of Chinese vocational schools appear to be well-balanced, with adhocracy being rated at the level of 22–23%, slightly lower than any of the other three components (25–27%). The clan component accounts for 27% of organizational culture, which is considerably lower than in Russia (34%, $p \leqslant 0.05$), where respondents would like an even more clan-oriented culture (36%, $p \leqslant 0.05$). Chinese students, meanwhile, perceive the existing relationship as quite comfortable psychologically, probably realizing that a stronger emphasis on the value of relationship stability is only possible at the expense of other important OC components that provide a high quality of vocational training. Even unanimity between students and teachers' perceptions is achievable with such a strong emphasis on the market component. However, such a rigidity of assessments suggests that development is likely to sink into stagnation in the longer term. Nevertheless, China demonstrates the best organizational culture indicators of all the three countries studied.

In Iranian vocational schools, the hierarchy component naturally prevails, reaching 40% in the perceptions of students and 33% in those of teachers. It is usually manifested in rigid discipline, attendance, home assignment, compliance and accountability policies. Students believe that such organizational culture standards stifle creativity and prevent a truly businesslike atmosphere from developing, in which order would not be ensured by administrative pressure but by recognizing the need for it and adopting the proper algorithms of learning organization. Students look for compensation in supporting the clan culture. They would like to change the existing OC structure by intensifying significantly the adhocracy component from 10 to 29%, reducing the already low (much lower than in Russia and China) market component from 19 to 11% and cutting down hierarchy from 40 to 27%, while preserving the existing level of clan orientation. In this case, the hierarchy component in Iranian organizational cultures would come close to that of Chinese vocational schools. Most probably, this data indicates that Iranian students are tired of excessive bu-

reaucratization in education, which they believe to curb creativity—the quality indispensable for learning new technology, boosting economic growth and reducing dependence on extractive industries.

A strong emotional reaction of students to bureaucratization of education, manifested in their desire to modify organizational culture of vocational schools essentially, may entail a considerable weakening of businesslike atmosphere in education, as it is perceived as just another layer and expression of hierarchy. Iranian students and teachers agree in rating the level of adhocracy in vocational schools as low (10 and 17%, respectively). The difference is significant between the assessments of students and teachers, as is the difference between Iranian and Russian statistics on the adhocracy component. However, students would like to increase adhocracy essentially, while teachers consider it reasonable to leave the level of innovativeness as it is. Students would also like to reduce hierarchy, whereas teachers want the hierarchy and clan components to remain as they are. As we can see, Iranian vocational teachers are as determined in their perceptions of organizational culture as their Chinese colleagues but differ fundamentally in their preferences: Chinese teachers seek to maintain a balanced OC with great emphasis on innovativeness, while Iranian teachers stick to the hierarchy–clan type of organizational culture which was typical of Soviet enterprises and which modern Russian managers are anxious to leave behind [Dyrin 2006; Zakharova, Leonova, Korobeynikova 2017]. Iranian students are craving for considerable changes but expect the market component to be reduced as part of such changes, which can hardly be regarded as reasonable.

4. Organizational Cultures of Firms as Perceived by Students and Teachers

Analysis of students and teachers' perceptions about organizational cultures of effective firms and prospective employers will provide a more comprehensive understanding of students' readiness to work for a modern organization (Table 2).

In Russian students' perceptions, organizational cultures of effective firms differ dramatically from those of the most probable employers in the emphasis they place on values of succeeding in a competitive environment-23% in real-life organizations vs. 26% in effective ones ($p \leqslant 0.05$)—and their level of hierarchy-24% in prospective employers vs. 19% in effective firms ($p \leqslant 0.01$). Adhocracy and clan components are perceived as equal in real-life vs. effective firms and close to those in vocational school organizational cultures, and the level of clan orientation peaks at 32%. These findings allow a conclusion that vocational students are not prepared to deal with levels of adhocracy other than in their school or to face the fact that the values of relationship are subordinate to those of innovation and competiveness in successful firms.

Teachers assess organizational cultures of effective firms quite adequately as oriented more towards adhocracy and market and less

Table 2. **Organizational cultures of modern firms as perceived by vocational school students and teachers in Russia, China and Iran**

Vocational schools		Perceptions about effective firms and prospective employers											
		Clan			Adhocracy (Innovativeness)			Market (Business)			Hierarchy		
		PE	Ef	W	PE	Ef	W	PE	Ef	W	PE	Ef	W
Russia	Stud.	32	32	(–)	22	23	(–)	23	26	*	24	19	**
	Teach.	31	28	T	21	26	*	19	22	T	28	24	*
	U	(–)	*		(–)	T		*	*		*	*	
China	Stud.	27	28	(–)	22	22	(–)	25	24	(–)	26	27	(–)
	Teach.	28	28	(–)	22	21	(–)	24	25	(–)	26	26	(–)
	U	(–)	(–)		(–)	(–)		(–)	(–)		(–)	(–)	
Iran	Stud.	19	22	*	24	28	*	27	16	**	31	35	*
	Teach.	26	26	(–)	17	17	(–)	23	23	(–)	34	33	(–)
	U	**	*		**	**		T	*		(–)	(–)	
U RVS–CVS Stud.		(–)	(–)		(–)	(–)		(–)	*		*	**	
U RVS–IVS Stud.		*	*		(–)	*		*	*		*	**	
U CVS–IVS Stud.		*	*		(–)	*		(–)	*		*	*	
U RVS–CVS Teach.		*	(–)		(–)	*		*	T		(–)	(–)	
U RVS–IVS Teach.		*	(–)		*	*		*	(–)		*	*	
U CVS–IVS Teach.		(–)	(–)		*	*		(–)	(–)		*	*	

Note: *PE*—perceptions about the OC of prospective employers, *Ef*—perceptions about the OC of effective modern firms.

towards clan and hierarchy than those of prevailingly ineffective firms that are likely to hire their graduates. Perceptions of Russian teachers are very similar to those of their Chinese colleagues, except for the level of innovativeness (26% in Russia vs. 21% in China, $p \leqslant 0.05$). Chinese teachers probably regard innovation as a more familiar organizational phenomenon and don't focus on it as much as Russian respondents.

Chinese teachers and students agree in giving equal assessments to organizational cultures of prospective employers and effective firms, describing them as well-balanced with statistically insignificant prevalence of hierarchy and clan characteristics. Obviously, both teachers and students are convinced that graduates will work for effective firms, which indicates that innovativeness is an immanent feature of Chinese industry.

Similar to their Russian peers, vocational students in Iran expect to be employed by firms that could hardly be seen as effective. They describe effective organizations as featuring much more adhocracy, hierarchy and clan and less of the market component (all differences being statistically significant). Teachers, meanwhile, see no difference between effective firms and prospective employers of graduates. This paradoxical finding means that teachers, as key agents of socialization, have no essential influence on young people's perceptions of problems faced by the Iranian economy. While Russian vocational teachers evaluate organizational cultures of effective firms more adequately than Russian students, the reverse is true for Iran. Perhaps, a high level of hierarchy in Iranian society impacts the behavior patterns of teachers, making them produce assessments that would be regarded as socially acceptable today.

By no means does this study claim to give an exhaustive overview of organizational cultures in modern vocational schools, particularly in different sociocultural contexts. In Russia as well in the other two countries, one may find other types of organizational cultures as well, some of which are close to those of innovative firms. However, the findings do suggest that a number of vocational schools need dedicated organizational socialization programs. In the Russian schools analyzed here, such programs could be targeted at improving students' understanding of the requirements to young employees imposed by the new economy, identifying the key organizational roles that students will undertake in their future career lives and filling those roles with specific personal and functional competencies. Special emphasis should be placed on teaching students innovations in economics: they should learn to understand the latest developments in technology, engineering and management, the requirements to industrial employee competences imposed by the innovative economy and the consequences of falling behind in innovative areas. There is a clear need for training teachers and tutors to design and implement such programs. A critical task faced by vocational school administrators today is to arrange student internships in firms that have adjusted successfully to the new technology paradigm and provide relevant organizational cultures, so that students not only learn their occupational roles but also engage in effective organizational socialization.

5. Conclusion

Our findings demonstrate efficiency of assessing vocational student readiness to work for a modern firm by analyzing the organizational culture values adopted in vocational schools. They also indicate a certain correlation between the socioeconomic context and student readiness to work in organizational cultures of specific types.

Since vocational schools represent social institutions, their vision of educational process can not only follow the goals of economic development but also involve anticipatory action initiatives. In particular,

organizational socialization of students may be designed to develop psychological readiness to organizational cultures of innovative firms. With regard to vocational schools, it appears especially significant for organizational socialization programs to resolve the conflict between the value of full compliance with operating procedures on the one hand and innovation readiness on the other.

Practices adopted by Chinese vocational schools can be regarded as a positive example of ensuring organizational socialization of students to prepare them to work for modern firms. However, the existing organizational culture characteristics of vocational schools in China involve the risk of growth inhibition.

Russian vocational colleges demonstrate considerable reserves for preparing students to work in the new economy, including the development of anticipatory organizational socialization programs. Teachers have an adequate overall idea of how effective firms are organized but fail to implement their knowledge to the full extent in teaching. One of the possible reasons for that consists in limited opportunities for vocational graduates to get a job in a modern innovative company.

In Iran, there is little possibility to create and implement organizational socialization programs due to predominantly and persistently conservative orientations among vocational teachers.

References

Bowman D. (2014) *Statistical Representations and Stereotypes of Youth Labor Market Participation. Insights from Australia*. Conference Paper. July 2014. Available at: https://www.researchgate.net/publication/268107501_Statistical_Representations_and_Stereotypes_of_Youth_Labour_Market_Participation_Insights_from_Australia (accessed 30 July 2020).

Brazhnikov P. (2016) Teoriya pokoleniy v kadrovoy politike i yeye svyaz s konkurentsiey rabotodateley na rynke truda [Generation Theory in Human Resource Policies and Its Relation to Employer Competition in the Labor Market]. *Trendy i upravlenie / Trends and Management*, no 2, pp. 194–201.

Cameron K.S, Quinn R. E. (2011) *Diagnosing and Changing Organizational Culture Based on the Competing Values Framework*. San Francisco, CA: Jossey-Bass.

Desmidt S., Prinzie A. (2019) Establishing a Mission-Based Culture: Analyzing the Relation between Intra-Organizational Socialization Agents, Mission Valence, Public Service Motivation, Goal Clarity and Work Impact. *International Public Management Journal*, vol. 22, no 4, pp. 664–690.

Dudyrev F., Romanova O., Travkin P. (2019) Trudoustroystvo vypusknikov sistemy srednego professionalnogo obrazovaniya: vse eshche omut ili uzhe brod [Employment of Vocational Graduates: Still a Slough or Already a Ford?]. *Voprosy obrazovaniya / Educational Studies Moscow*, no 1, pp. 109–136. DOI: 10.17323/1814–9545–2019–1–109–136

Dyrin S. (2006) *Rossiyskaya model upravleniya personalom v usloviyakh promyshlennogo predpriyatiya* [Russia's HR Management Model in Industrial Contexts], St. Petersburg: Piter.

Dyrin S., Nizamieva A., Shaydullina Ch., Bykanova K., Khazeeva A. (2017) Organizatsionnaya kultura kak factor povysheniya effektivnosti organizatsii uchebno-vospitatelnoy raboty v kolledzhe [Organizational Culture as a Factor in

Improving the Effectiveness of the Organization of Teaching and Educational Work in the College]. *World of Science. Pedagogy and Psychology*, vol. 5, no 2. Available at: http://mir-nauki.com/PDF/29PDMN217.pdf (accessed 30 July 2020).

Farag M. S. Elias R. (2016) The Relationship between Accounting Students' Personality, Professional Skepticism and Anticipatory Socialization. *Accounting Education*, vol. 25, no 2, pp. 124–138.

Fetherston M. (2017) Information Seeking and Organizational Socialization: A Review and Opportunities for Anticipatory Socialization Research. *Annals of the International Communication Association*, vol. 47, no 3–4, pp. 258–277.

Fossen F., Sorgner A. (2019) Mapping the Future of Occupations: Transformative and Destructive Effects of New Digital Technologies on Jobs. *Foresight and STI Governance*, vol. 13, no 2, pp. 10–18. DOI: 10.17323/2500–2597.2019.2.10.18

Giddens A. (2005) *Sotsiologiya* [Sociology]. Moscow: Editorial URSS.

Jaskyte K. (2005) The Impact of Organizational Socialization Tactics on Role Ambiguity and Role Conflict of Newly Hired Social Workers. *Administration in Social Work*, vol. 29, no 4, pp. 69–87.

Kalendzhyan S., Kuzmina T. (2017) Vovlechennost personala kak osnova kultury souchastiya [Employee Involvement—Foundation for Culture of Participation]. *International Journal of Management Theory and Practice*, no 10, pp. 112–126.

Karpov A., Perevozkina Yu. (2019) Strukturno-temporalnaya sistemnost rolevoy sotsializatsii [Structural and Temporal System of Role Socialization]. *Systems Psychology and Sociology*, no 3, pp. 5–17. DOI: 10.25688/2223–6872.2019.31.3.01

Korte R. (2010) First, Get to Know them: A Relational View of Organizational Socialization. *Human Resource Development International*, vol. 13, no 1, pp. 27–43.

Kucherov D. G., Zamulin A. L., Tsybova V. C. (2019) How Young Professionals Choose Companies: Employer Brand and Salary Expectations. *Russian Management Journal*, vol. 17, no 1, pp. 29–46.

Kvachev V., Yudina M. (2017) Industriya 4.0: porazhenie raboty ili pobeda tvorcheskogo truda? [Industry 4.0: A Loss for Labor or a Victory for Creative Work?]. *E-journal. Public Administration*, October, pp. 140–158. Available at: https://www.researchgate.net/publication/320923272_Industria_40_porazenie_raboty_ili_pobeda_tvorceskogo_truda_Industry_40_A_Loss_for_Labor_or_a_Victory_for_Creative_Work (accessed 30 July 2020).

Mamedova N. (2015) Iranskaya ekonomika v usloviyakh sanktsiy [Iranian Economy Under Sunctions]. *Mirovoe i natsionalnoe khozyaystvo*, vol. 32, no 1. Available at: https://mirec.mgimo.ru/2015–01/iranskaa-ekonomika-v-usloviah-sankcij (accessed 30 July 2020).

Nagimova N., Fakhretdinova M. (2019) Klyuchevye trendy razvitiya «novoy ekonomiki»—tselevoy orientir podgotovki professionalnykh kadrov [Key Trends in the Development of the "New Economy"—the Target Point of Professional Personnel Training]. *The Journal of Secondary Vocational Education*, no 2, pp. 11–16.

OECD (2017) Developments in Individual OECD and Selected Non-Member Economies. Russian Federation—Economic Forecast Summary. P. 216–219. Available at: http://www.oecd.org/eco/outlook/economic-forecast-summary-russia-oecd-economic-outlook.pdf (accessed 30 July 2020).

Schwartz S. H. (2012) Refining the Theory of Basic Individual Values. *Journal of Personality and Social Psychology*, vol. 10, no 4, pp. 663–688.

Scott A., Herbst S. A., Houmanfar R. (2009) Psychological Approaches to Values in Organizations and Organizational Behavior Management. *Journal of Organizational Behavior Management*, vol. 29, no 1, pp. 47–68.

Temnitskiy A. (2014) Stanovlenie naemnogo rabotnika rynochnogo tipa v usloviyakh transformatsii otnosheniy sobstvennosti [Making of Hired Worker under Transformation Conditions]. *Sotsiologicheskie Issledovaniia / Sociological Studies*, no 5, pp. 47–58.

Van Maanen J. (1978) People Processing: Strategies of Organizational Socialization. *Organizational Dynamics*, no 7, pp. 18–36.

Van Maanen J., Schein E. (1979) Towards a Theory of Organizational Socialization. *Research in Organizational Behavior*, no 1, pp. 209–264.

Vnutskikh A., Komarov S. (2019) «Russkaya model upravleniya» i problema proizvoditelnosti truda: filosofskiy analiz [Russian Management Model and the Problem of Labor Productivity: Philosophical Analysis]. *Vestnik Permskogo Universiteta. Seriya Filosofia Psikhologiya Sotsiologiya / Perm University Herald. Series "Philosophy. Psychology. Sociology"*, iss. 4, pp. 473–482.

Zakharova L., Vlaskin V. J.1, Orlova O. (2017) Proforientatsionnaya sotsializatsiya kak obnovlennaya paradigma sotsialno-psikhologicheskoy podgotovki k trudovoy deyatelnosti [Vocational Socialization as an Updated Paradigm of Socio-Psychological Work Preparation]. *Fundamentalnye i prikladnye issledovaniya sovremennoy psikhologii: rezultaty i perspektivy razvitiya* [Fundamental and Applied Research of Modern Psychology: Results and Prospects of Development] (eds A. Zhuravlev, V. Koltsova), Moscow: Institute of Psychology of Russian Academy of Sciences, pp. 2603–2611.

Zakharova L., Leonova I., Korobeynikova E. (2017) *Tsennostny konflikt i psikhologicheskaya zhiznesposobnost personala rossiyskikh predpriyatiy* [Competing Values and Psychological Resilience of Industrial Workers in Russia], Nizhny Novgorod: Lobachevsky State University of Nizhny Novgorod.

Zavyalova E., Alsufyev A., Krakovetskaya I., Lijun W., Li J. (2018) Razvitie personala v kitayskikh innovatsionno-aktivnykh kompaniyakh [Personnel Development in Chinese Innovation-Active Companies]. *Foresight and STI Governance*, vol. 12, no 3, pp. 43–52. DOI: 10.17323/2500–2597.2018.3.43.52

Zdravomyslov A. (1986) *Potrebnosti. Interesy. Tsennosti* [Needs. Interests. Values], Moscow: Politizdat.

Training Simulators in Vocational Education: Pedagogical and Technological Aspects

Authors

Fedor Dudyrev
Candidate of Sciences in History, Director of the Center for Vocational Education and Skills Development, Institute of Education, National Research University Higher School of Economics.
E-mail: fdudyrev@hse.ru

Olga Maksimenkova
Candidate of Sciences in Information Systems and Processes, Junior Researcher, International Laboratory for Intelligent Systems and Structural Analysis, Faculty of Computer Science, National Research University Higher School of Economics.
E-mail: omaksimenkova@hse.ru

Address: 20 Myasnitskaya Str., 101000 Moscow, Russian Federation.

Abstract

This article provides a review of literature on using training simulators in vocational education and training and explores the vocational pedagogy approaches to describing training simulators as a tool for vocational skill development. We examine simulators applied in medical, engineering and teacher training education, present a general taxonomy of practice-oriented training models, and analyze the role of simulators as specific learning media. This review can be useful for developing and implementing initiatives within the Human Resources and Education component of the Digital Economy National Program (in particular, integrating simulators in vocational and higher education).

Keywords

training simulators in vocational education and training, virtual simulations, learning environment.

References

Abzaliev K., Daniyarov N., Saidalin D. et al. (2018) Sroki formirovaniya navykov u khirurgov po vyazaniyu uzlov [The Length of Training for Surgeons to Acquire the Skills of Making Surgical Knots]. *Virtual Simulators in Medicine*, no 2 (20), pp. 21–22.

Alinier G. (2007) A Typology of Educationally Focused Medical Simulation Tools. *Medical Teacher*, vol. 29, no 8, pp. 243–250. Available at: https://www.tandfonline.com/doi/full/10.1080/01421590701551185 (accessed 30 June 2020).

Bashmakov A., Bashmakov I. (2003) *Razrabotka kompyuternykh uchebnikov i obuchayushchikh sistem* [Development of Electronic Textbooks and Training Systems]. Moscow: Filin.

Bell B. S., Kanar A. M., Kozlowski S. W.J. (2008) *Current Issues and Future Directions in Simulation-Based Training. CAHRS Working Paper no 492.* Ithaca, NY: Cornell University. Available at: http://digitalcommons.ilr.cornell.edu/cahrswp/492 (accessed 30 June 2020).

Bolelov E., Prokhorov A., Prokofiev I. (2018) *Aviatsionnye trenazhery: uchebnoe posobie* [Aviation Simulators: Study Guide]. Moscow: Akademiya Zhukovskogo.

Boström L. (2013) How Do Students in Vocational Programs Learn? A Study of Similarities and Differences in Learning Strategies. *International Journal of Sciences*, vol. 2, August, pp. 44–56.

Buzink S., Goosens R., de Ridder H., Jakimowicz J. (2010) Training of Basic Laparoscopy Skills on SimSurgery SEP. *Minimally Invasive Therapy & Allied Technologies*, vol. 19, iss. 1, pp. 35–41.

Cannon-Bowers J.A., Bowers C. A. (2008) Synthetic Learning Environments. *Handbook of Research on Educational Communications and Technology* (eds J. M. Spector, M. D. Merrill, J. van Merrienboer, M.P Driscoll), Mahwah: Lawrence Erlbaum, pp. 317–327. Available at: https://www.researchgate.net/publication/268371527_Synthetic_Learning_Environments (accessed 30 June 2020).

CEDEFOP (2015) *Vocational Pedagogies and Benefits for Learners: Practices and Challenges in Europe*. Luxembourg: Publications Office of the European Union. Available at: https://www.cedefop.europa.eu/files/5547_en.pdf (accessed 30 June 2020).

Chini J., Straub C. L., Thomas K. (2016) Learning from Avatars: Learning Assistants Practice Physics Pedagogy in a Classroom Simulator. *Phisical Review Phisics Education Research*, vol. 12, iss. 1, art. no 10117. Available at: https://journals.aps.org/prper/abstract/10.1103/PhysRevPhysEducRes.12.010117 (accessed 30 June 2020).

Dozortsev V. M. (2009) *Kompyuternye trenazhery dlya obucheniya operatorov tekhnologicheskih processov* [Computer Simulators for Training of Operators of Technological Processes]. Moscow: SINTEG.

Goodyear P. (2001) *Effective Networked Learning in Higher Education: Notes and Guidelines. Final Report to Networked Learning in Higher Edu-cation Project (JCALT).* Available at: https://www.academia.edu/314168/Effective_networked_learning_in_higher_education_notes_and_guidelines (accessed 30 June 2020).

Hertel J., Millis B. (2002) *Using Simulations to Promote Learning in Higher Education: An Introduction*. Sterling, VA: Stylus.

Khaled A., Gulikers J., Biemans H., van der Wel M., Mulder M. (2014) Characteristics of Hands-On Simulations with Added Value for Innovative Secondary and Higher Vocational Education. *Journal of Vocational Education & Training*, vol. 66, iss. 4, pp. 462–490. http://dx.doi.org/10.1080/13636820.2014.91769618.

Kis V. (2017) Work-Based Learning for Youth at Risk: Getting Employers on Board. OECD Education Working Papers no 150. Paris: OECD. https://dx.doi.org/10.1787/5e122a91-en

Kis V. (2016) *Work, Train, Win: Work-Based Learning Design and Management for Productivity Gains. OECD Education Working Papers no 135*. Paris: OECD. http://dx.doi.org/10.1787/5jlz6rbns1g1-en

Klykov V., Yeltsov A., Shatlov K. (2006) Interaktivnye kompyuternye trenazhery po integralnomu ischisleniyu i differentsialnym uravneniyam [Interactive Computer Simulators for Integral Calculus and Differential Equations]. *Izvestiya Tomskogo politekhnicheskogo universiteta. Inzhiniring georesursov*/Bulletin of the Tomsk Polytechnic University-Geo Assets Engineering, vol. 309, no 2, pp. 255–260.

Klyuchko V., Kushnir N., Matyazh A., Zhukov V. (2016) Tekhnologii virtualnoy realnosti: sovremennye simulyatory i ikh primenenie v meditsine [Virtual Reality Technology: Modern Simulation and Their Application in Medicine]. *Scientific Works of the Kuban State Technological University*, no 15, pp. 94–104.

Kubyshkin V., Svistunov A., Gorshkov M., Balkizov Z. (2016) *Specialist Meditsinskogo simulyatsionnogo obucheniya* [Specialist in Medical Simulation Training]. Moscow: ROSOME Russian Society of Simulation Training in Medicine. Available at: https://rosomed.ru/documents/spetsialist-medit-

sinskogo-simulyatsionnogo-obucheniya-uchebnoe-posobie (accessed 30 June 2020).

Kuczera M. (2017a) *Incentives for Apprenticeship. OECD Education Working Papers no 152*. Paris: OECD. http://dx.doi.org/10.1787/55bb556d-en

Kuczera M. (2017b) *Striking the Right Balance: Costs and Benefits of Apprenticeship. OECD Education Working Papers no 153*. Paris: OECD. http://dx.doi.org/10.1787/995fff01-en

Martynova N., Kuzmin A., Alikberova M., Lozovitsky D. (2018) Meditsinskie trenazhery kak basis dlya otrabotki khirurgicheskikh navykov [Medical Simulators as a Basis for Processing Surgical Skills]. *Health and Education in the 21st Century,* no 1, pp. 108–113.

Mavritsina T. (2000) *Obuchayushchie trenazhery* [Traning Simulators]. Moscow: Moscow Power Engineering Institute.

Mislevy R. J. (2011) *Evidence-Centered Design for Simulation-Based As-sessment. CRESST Report 800*. Los Angeles, CA: University of California, National Center for Research on Evaluation, Standards, and Student Testing (CRESST). Available at: https://files.eric.ed.gov/fulltext/ED522835.pdf (accessed 30 June 2020).

Mühlemann S. (2016) *The Cost and Benefits of Work-based Learning. OECD Education Working Papers no 143*. Paris: OECD. http://dx.doi.org/10.1787/5jlpl4s6g0zv-en

Palevskaya S., Taktarov V. (2015) *Sovremennye simulyatory i trenazhery dlya podgotovki meditsinskoy sestry* [Modern Simulators and Training Equipment in Nursing Training]. Paper presented at IV forum Russian Society of Simulation Training in Medicine (Moscow, October 1–2). Available at: https://rosomed.ru/theses/158 (accessed 30 June 2020).

Pyshcheva L., Ugnich K., Shchukin U., Soloviev V. (2016) *Analiz simulyatsionnogo obucheniya studentov navykam serdechno-legochnoy reanimatsii na manekene—imitatore patsienta* [Analysis of Students Skills Training in Cardio-Pulmonary Resuscitation Based on Patient Phantom Simulation]. Paper presented at V forum Russian Society of Simulation Training in Medicine (Moscow, September, 29–30). Available at: https://rosomed.ru/theses/359 (accessed 30 June 2020).

Qayumi K., Pachev G., Zheng B. et al. (2014) Status of Simulation in Health Care Education: An International Survey. *Advances in Medical Education and Practice*, vol. 5, November, pp. 457–467. Available at: https://www.dovepress.com/status-of-simulation-in-health-care-education-an-international-survey-peer-reviewed-fulltext-article-AMEP (accessed 30 June 2020).

Serdyukov A. (ed.) (2009) *Trenazhery i tekhnicheskie sredstva obucheniya* [Simulators and Training Facilities]. Moscow: Oruzhie i tekhnologii.

Shukshunov V. (2005) *Trenazhernye kompleksy i trenazhery: tekhnologii razrabotki i opyt ekspluatatsii* [Simulation Complexes and Simulators: Technologies of Development and Operating Experience]. Moscow: Mashinostroenie.

Silva F. A., Medeiros S., Costa R., de Araújo M. (2017) Types, Purposes and Simulation of Contributions in Vocational Training in Health: Narrative Review. *International Archives of Medicine*, vol. 10, no 3. Available at: http://imedicalsociety.org/ojs/index.php/iam/article/view/2258 (accessed 30 June 2020).

Solovov A., Mishchuk V. (2007) *Intellektualnye trenazhery i virtualnye laboratorii: uchebnoe posobie* [Intellectual Simulators and Virtual Laboratories: Study Guide]. Samara: Samara State Aerospace University.

Stone R., Watts K., Zhong P. (2011) *Virtual Reality Integrated Weld Train-ing. A Scientific Evaluation of Training Potential, Cost Effectiveness and Implication for Effective Team Learning*. Ames, Iowa: Iowa State University.

Available at: https://yandex.ru/search/?text=Virtual%20Reality%20Integrated%20Weld%20Training&lr=10758&clid=2139456 (accessed 30 June 2020).

Svistunov A. (ed.) (2013) *Simulyatsionnoe obuchenie v medicine* [Simulation-Based Training in Medicine]. Moscow: MSMU named after I. M. Sechenov.

Toth P. (2012) Learning Strategies and Styles in Vocational Education. *Acta Polytechnica Hungarica*, vol. 9, no 3, pp. 195–216.

Trukhin A. (2008) Analiz sushchestvuyushchikh v RF trenazherno-obuchayushchikh system [The Analysis of Computer Training Systems Developed in Russian Federation]. *Open and Distance Education*, no 1, pp. 32–39. Available at: https://vestnik.mininuniver.ru/jour/article/viewFile/196/197 (accessed 30 June 2020).

Zitter I., de Bruijn E., Simons P. R.J., Ten Cate T. J. (2011) Adding a Design Perspective to Study Learning Environments in Current Higher Education. *Higher Education*, vol. 61, no 4, pp. 371–386.

Zitter I., Hoeve A. (2012) *Hybrid Learning Environments: Merging Learning and Work Processes to Facilitate Knowledge Integration and Transitions. OECD Education Working Paper* no 81. Paris: OECD. http://dx.doi.org/10.1787/5k97785xwdvf-en

Glocalization of Higher Education in a Post-Socialist Country: the Case of Lithuania

Rimantas Želvys

Rimantas Želvys
Prof. habil. dr., Institute of Educational Sciences, Faculty of Philosophy, Vilnius University. Address: Universiteto str. 9, Vilnius 01513, Lithuania. E-mail: rimantas.zelvys@fsf.vu.lt

Abstract. The paper focuses on some aspects of reforming higher education in a post-socialist country. The study is based on a case analysis of transformations in Lithuanian higher education and addresses the overarching research question—why post-socialist countries, which three decades ago had similar or almost identical educations systems, moved along different trajectories of change instead of initially predicted further convergence. Changes in a period of transition moved some countries closer to the predominant Western system of higher education, while some other former Soviet republics maintained many elements of the previous model or chose alternative paths of development. We assume that globalization of education still remains the driving force for many educational changes in post-socialist area. However, the Soviet legacy and other country-specific factors modify the rationale and the contents of the reforms which implies different final results. The level of socio-economic development is another extremely important factor which determines the quality and scope of education reforms. In comparative research we encounter the phenomena which is called glocalization—global developments in a specific area mix with local culture produce the specific outcomes. The study reveals that the global trends of standardization, marketization, accountability and cost-effectiveness to a certain extent correspond with the Soviet tradition of unification, lack of trust and punitive nature of controlling institutions. In Lithuanian case the Western ideas of reforming higher education were accepted selectively and stimulated reforms, which in general followed the common post-socialist pattern of „path dependency" but at the same time produced some interesting country-specific outcomes.

Keywords: globalization and glocalization, higher education, post-socialist countries, education reforms, world culture and world systems theories.

DOI: 10.17323/1814-9545-2020-3-277-302

Introduction

Comparative studies of post-socialism is a challenging object of educational research, which, according to our understanding, still doesn't get as much attention as it deserves. There are not so many publications on the topic, at least in research journals published in English. During the last decade there were several comprehensive studies of post-socialist education [Silova 2010; Chankseliani, Silova 2018; Silo-

va, Piattoeva, Millei 2018; Huisman, Smolentseva, Froumin 2018], but, having in mind that a post-socialist world includes about 30 countries and occupies a vast territory of the Eurasian continent, it's far from enough. Semyonov and Platonova [2018] note that the simultaneous start of countries' own trajectories makes the observed period the field of „natural experiment" which should be described. However, comparativists still insufficiently explore research opportunities provided by the above mentioned „natural experiment". Perhaps one of the reasons is that development of education after the fall of the Berlin wall was considered to be a linear process of turning a „backward" socialist system into a more „advanced" Western one by just dully following the prevailing contemporary fashions in education. In comparative education the studies of post-socialist transformations were mainly focused on tracing the trajectories of the Western reform paths as well as broader concepts circulating internationally [Silova 2012]. Post-socialist countries were labelled „transition" countries having in mind that after a certain transitory period, most probably with a somehow different pace and level of success, they will rearrange their systems of education in accordance with the Western standards. Therefore after a relatively short rise of interest Western comparativists apparently decided that the process of convergence will proceed along the traditional lines and the topic of backward countries catching-up with the West doesn't offer much new or interesting material for research. Bain [2010] notes that the belief of many researchers in the West was based on the assumption that there is one Western educational model that needs to be replicated and that there is only one way of implementing this model. Three decades have passed, and now it's obvious that the process of transition in post-socialist area is far from over. The term „transition countries" currently is seldom used as it assumes that there is some final point in the process of transformation. However, nowadays it's almost universally acknowledged that change is a permanent state of being in a post-modern world. A Western model seems to become a moving target, a „brave new world" of neoliberal capitalism didn't meet all the expectations, and the final goal of catching up with the West is currently questioned by at least some of the countries from the former Soviet campus.

At the initial phase of transition there appeared to be two dominant modes of reforming education: „returning to the past" and „borrowing from abroad" [Anweiler 1992]. The same tendency still can be traced nowadays, when the educational reforms tend to follow the long-lasting tradition of educational borrowing and lending [Spring 2009], but at the same time the process is almost inevitably followed by various manifestations of path-dependency [Szolar 2015; Leišytė, Rose, Schimmelpfenning 2018]. One of the possible answers to the overarching research question—why post-socialist countries, which three decades ago had similar or almost identical educations systems, moved along different trajectories of development instead of initially

predicted further convergence—is that in each country one can observe different mix of cultural and historical specificity, Soviet legacy and the impact of global forces. The level of socio-economic development is another extremely important factor which determines the quality and scope of education reforms. In this respect former Soviet republics encounter very different socio-economic realities. Post-socialist countries had to learn the lesson that transition to market economy doesn't always bring prosperity. Inequality manifests itself not only within the countries, but also between the countries. For example, human development index in post-Soviet region ranges from very high (0,882) in Estonia to medium (0,656) in Tajikistan [UNDP 2020]. Idea of convergence is based on a theoretical assumption of world culture theorists that all cultures are integrating into a single global culture, in which world education culture is nested [Spring 2009]. However, the course of events during the three decades makes us think that perhaps world system theory, which claims that educational ideas are imposed by the economic power and global institutions, like the OECD and the World Bank, can better explain the peculiarities of post-socialist development. Supporting the arguments of world system theorists is postcolonial analysis, which stresses that Western-type education spread around the globe as a result of cultural imperialism. In its current manifestation, postcolonial powers promote market economies, human capital education, and neoliberal school reforms to promote the interests of the rich nations and powerful multinational corporations [Ibid.]. Divergence of post-socialist economies and social welfare models, as well as national education systems, can be explained by different roles allocated to them in the global market.

Comparative analysis of post-socialist countries is a complicated task for a number of reasons. One of the reasons is the lack of trustworthy information. The least complicated is collecting data about the EU and OECD countries, as all the member states possess vast statistical data bases: OECD Education at a Glance, EU Eurostat, etc. Quite different are the possibilities of getting reliable statistics, for example, about some Central Asian countries. The second reason is related to the territorial disputes. Many former Soviet republics have territorial disputes and it's difficult to judge which territory we should include in the comparison. Is Crimea a Russian or Ukrainian territory? Russian and Ukrainian sides will give different answers and educational statistics provided by them apparently will be different. The same applies to Transnistria, Nagorny Karabakh, South Osetia, Abkhasia, Doneck and Lugansk regions, etc. Still another problem, inherited from the Soviet past, is the tendency of showing-off. A typical example is playing with the results of PISA and other large-scale student achievement studies. Chapman et al. [2016] warn that one of the deficiences of PISA is the ability of the countries to play with the results by entering data from a limited range of social and geographical areas within them. The trick of playing with data is often used for poltical reasons: authoritar-

ian political leaders like to boast the success of their countries and national educational agencies are obliged to reach the prescribed indicators at any cost. One may say that it's a rather common practice worldwide, but former Soviet republics have inherited the experience of extremely sophisticated ways of playing with numbers. One of the possible solutions to challenges emerging in post-socialist studies is a country case analysis. Case analysis approach provides researchers an opportunity to reveal country-specific peculiarities of development and to compare countries between themselves in areas wherever the data is comparable.

Though some authors note that the influence of globalization is exaggerated [Rasmussen 2003] or is „on a retreat" [Spring 2009], in our study we rely on the assumption that globalization of education still remains the driving force for many educational changes in post-socialist area. However, the Soviet legacy and other country specific factors modify the rationale and the contents of the reforms with implies different final outcomes. Marginson and van der Wende [2007] note that global convergences are subject to local, sub-national and national influences and countervailing forces, including governmental regulation and academic cultures. Hence the effects of globalisation are also differentiated. Chankseliani and Silova (2018) observe that in post-socialist countries there is little evidence of educational convergence towards neoliberal educational goals when looking beyond policy rhetoric and digging deeper into local educational contexts. In comparative studies the phenomena is often called called glocalization—global developments in a specific area mix with local culture produce the specific outcome [Niemczyk 2019]. In our case the mix is flavoured by the presence of Soviet legacy, the influence of which in different post-socialist countries may be quite different and range from total neglect to almost open adoration. We chose higher education sector for our case analysis as higher education seems to be the best example to illustrate global tendencies in education. Historically higher education was allways more internationally open, and for that reason higher education systems, policies and institutions are being transformed by globalisation [Marginson, van der Wende 2007]. We selected several examples of development in higher education, starting with centralized school leaving examinations and ending with international university rankings, in order to reflect in what way these manifestations are accepted and transformed within the local context. In other words, the object of our research is the Lithuanian version of glocalization in higher education.

School Leaving Examinations and General Admission to Institutions of Higher Education

In 1997 Lithuania established the National Examination Centre and in 1999 ran centralized school leaving examinations for the first time. One of the key objectives of the reform was to build a bridge between secondary and higher education. The agreement of universities to sup-

port the reform process by recognizing the results of school leaving examinations and by not running their own entrance exams was crucial to the success of the program. Foreign partners, which provided technical assistance, were the Scottish Examination Board and Slovenian National Examination Centre [Bethel, Zabulionis 2000]. Luckily all major Lithuanian universities supported the examination reform. Initially some smaller universities and colleges hesitated as they were worried about the risks of competing for students with major universities, but eventually they also joined the system of common admission. Association of Lithuanian Higher Education institutions for Organization of Common Admission manages the system of admission to higher education institutions and in accordance with the results of school leaving examinations offers possible placements to students. Lithuania was one of the first post-socialist states to introduce centralized school leaving examinations. The reform was praised by the OECD experts, who noted that National Examination Centre „has done a remarkable job in improving the reliability, validity and comparibility of examinations" [OECD, 2002; 109]. During the next two decades there were several minor changes in running the examinations and assessing the results, but there were no attempts to challenge the existing system. However, in the long run the problems started to emerge. The introduction of the centralized school leaving examinations evoke a wave of private tutoring. A new market of educational services was formed, where teachers were earning extra income by preparing students for the forthcoming examinations. Research, conducted by the Research and Higher Education Monitoring and Analysis Centre (MOSTA), showed that 40 percent of students in the 12th grade were taught by private tutors. In the capital city of Vilnius the percentage was 47 [MOSTA, 2019]. Secondly, researchers observe a „backwash" effect, when in the final grade teachers tend to change their curriculum in accordance with the tasks of the previous examination. Thus, instead of teaching the curriculum, teachers train students to complete the examination tasks. And, last but not least, centralized school leaving examination partially lost the primary function of selecting the most talented students for higher education institutions. During the last two decades the numbers of school leavers were decreasing due to demographical reasons and emigration. Currently there is practically no competition for admission to majority of the study programs with the exception of the most prestigious ones, e. g. medicine or law. The increasing numbers of students tend to choose studies in other EU universities. Universities in many Western European countries usually accept students' applications in autumn and on the basis of the results of the 11th grade decide about their admission to study programs. After students receive the confirmation of acceptance from a foreign university, national examination marks become irrelevant for them: all they need is to get the school-leaving certificate. Changes which happened during the recent years evoked discussions about cancelling or

modifying the centralized school leaving examinations. Critics claim that the exams have already completed their mission. The supporters of a modified model seek to align a classroom-based assessment with admission to higher education programmes through moderated grading, or to realign the framework and content of centralized examinations to reflect more fully the curriculum taught in schools. In 2017 the Ministry of Education, Science and Sports launched a project to establish an optional assessment, the results of which would be included in the secondary school-leaving certificate and would count as an equivalent of centralized school-leaving examination. Students will be required to plan, implement and present a project, which will be assessed by an independent assessment board. OECD experts warn to monitor closely the take-up of the project option and keep under consideration other means of assessment. In search of the possible alternatives the OECD experts sugest to consider using the 10th grade national student achievement examination as a component of higher education admission process—in conjunction with centralized school leaving examinations [OECD2017]. Higher education institutions remain the strongest supporters of the current system of using school leaving examinations for student admission. In case of introduction of optional assessment they claim to consider the option of re-establishing the entrance examinations.

Three-Cycle Degree System and the Bologna Process

Two-cycle (Bachelor and Masters) degree system was introduced in Lithuania in 1989 with the re-establishment of Vytautas Magnus University in Kaunas, which was closed down in 1950 for political reasons. The university was re-established with the support of expatriates from the USA and Canada who suggested the Anglo-Saxon higher education model as an alternative to the still prevailing Soviet one. The system was legitimized by the 1991 Law on Higher Education, which also introduced the scientific degrees of doctor and habilitated doctor instead of former degrees of candidate and doctor of sciences. Doctoral studies were introduced instead of aspirantura, and thus the two-cycle system was transformed into a three-cycle system. The nostrification procedure, which reviewed disertations defended during the socialist period and converted Soviet-type candidate and doctoral diplomas into degrees of doctors and habilitated doctors, started next year after the adoption of the new Law in 1992 and lasted until 1995. The requirements for nostrification were not very rigorous and eventually 8454 scientific degrees were nostrified out of 8507 [Daujotis et al. 2012]. When in 1999 Lithuania signed the Bologna declaration, the three-cycle degree system in the country was already functioning for almost a decade. Universities didn‘t experience much difficulties of adopting the new system. After exclusion of ideological disciplines and military training, the former five year study programs were just fit for the four year Bachelor model. Some programs, e. g. engineering and medicine,

retained the previous study format. However, introduction of Masters level caused more difficulties. Some time and efforts were needed to realize that Masters is not just a further continuation of previous studies, but also implies either a deepening of knowledge in a more narrow study area or widening a range of competencies by choosing a different field of study (Masters studies in legal documents were accordingly classified as deepening or widening studies). The 2009 Law on Higher Education allows three-year Bachelor studies, however, universities are reluctant to shorten the length of studies as it implies the reduction of income and working hours for university teachers. In order to gain a competitive advantage some universities recently offered a shortened version of 3,5 year-long Bachelor studies. Certain problems of compatibility also emerged with the introduction of the binary higher education system in 2000, when former technicums were reorganized into non-university higher education institutions—colleges. Colleges were granted the right to offer studies of professional Bachelor, which last for three years, in contrast to university training of academic Bachelor, majority of which last for four years. Therefore, unlike in many other European countries, where students with first-cycle degrees are accepted to Masters degree programs without additional requirements, Lithuanian college graduates usually need to complete additional coursework before being accepted for a second-cycle degree at university [Leišytė, Rose, Želvys 2019]. Soon after gaining the status of higher education institutions the colleges started to lobby the introduction of professional Masters degree programs, to which students could be admitted after completion of professional Bachelor without any additional requirements [Želvys 2004], but on this topic they encountered a fierce opposition of universities. A new challenge was the introduction of the competence-based learning and the ECTS system. Competencies are defined as a dynamic combination of cognitive and metacognitive skills, knowledge and understanding, interpersonal, intellectual and practical skills, and ethical values, which have to be developed during the studies and asessed at different stages of study programs [Gonzalez, Wagenaar 2008]. University and college teachers faced a complicated and time-consuming job of rewriting all the study programs in accordance with the requirements of a competence-based model. Since mid-1990s Lithuanian HEIs used the national credit system and ECTS was only used for mobility purposes. Based on the 2009 Law on Higher Education, the use of ECTS has become compulsory in 2011 [Leišytė, Želvys, Zenkienė 2015]. Many HEIs considered it as a simple technical problem and just transferred the national credits into ECTS. However, in fact the system of ECTS introduced a totally new approach of calculating and assessing the student workload. In 2011 Vilnius University launched a project of introducing the ECTS system into Lithuanian HEIS, which was funded from EU structural funds. Despite the apparently successfull integration of the ECTS system there are still issues with the full academic recogni-

tion of studies or courses performed by students abroad [Ibid.]. Study programs in different universities are not identical, and faculty administration sometimes feels that students who have been away for one semester have missed some essential obligatory courses. In this case they can offer to undertake these courses during the next semester as the optional ones [Leišytė, Rose, Želvys 2019]. There also are other problems related to student mobility. Students who study and work refuse to leave the country for the whole semester as they fear of losing their jobs. A language barrier also exists as not all partner universities offer study programs in English. Many students don't know any foreign language other than English (except, of course, students of German, French or Russian philology). And, last but not least, students are hesitant to participate in mobility programs for financial reasons, because ERASMUS+ grant hardly covers the costs of living in more expensive foreign countries (e.g., the Scandinavian region, Switzerland or United Kingdom). Despite the above mentioned barriers, there are stil more students going abroad than students coming to Lithuania. The dominating mobility tendency is moving westwards: Lithuanian students mainly go to Western European universities, while majority of the incoming students come from the Eastern Europe.

Performance-Based Evaluation and Funding

At the end of the Soviet era 29 scientific research institutes where operating in Lithuania. Some of them used to be funded from central budget and after the fall of the Soviet regime part of the institutes lost their sources of funding. Doubts were also voiced about the relevance of their current research activities as their initial mission was to develop new technologies for the Soviet military-industial complex. In a difficult economical situation of the early 1990s all scientific research institutes were equally underfunded, though their research input was uneven. In 1997 the Government formed several expert groups in order to assess the scientific productivity of research institutes and to link their performance with the level of funding. Experts classified all research institutes into six groups. The first three groups (more advanced research institutes) were expected to get 100 percent of state funding, while another three groups (less advanced research institutes)—75 percent of state funding. All institutes could pretend for the rest of the funding on a competitive basis. However, the government didn't dare to apply the new funding scheme neither in 1998, nor in 1999. In 1999 research institutes underwent another round of assessment and subsequently were divided into seven groups. In a distribution of the budget for 2000 a formula funding was applied with different coefficient for each group. In 2001 an updated formula was introduced both for research institutes and universities. 40 percent of research funding for both types of institutions was performance-based, while the rest 60 percent was provided for maintaining research infrastructure. Three groups of performance indicators

were applied for assessment purposes: number of scientific publications, number and budget of scientific projects, amount of income from applied research for the industrial and other needs (Daujotis et al., 2002). Eventually most of the institutes merged with universities and nowadays there are 13 independent state and 9 private research institutes, though further mergers are expected. During the last two decades there were several modifications of performance-based evaluation. The current model is a combination of peer review and formal evaluation. Universities and research institutes themselves have to select a certain amount of research production of highest quality (the so-called I level, which, e. g., in social sciences and humanities constitutes 20% of all the production). Expert groups, which are selected and appointed by the Lithuanian Research Council, evaluate the contents of I level research works. The rest of research production (II level) undergo formal evaluation, when experts evaluate not the contents, but the formal status of research production (e. g. papers published in journals with impact factor, which are included into Clarivate Analytics or SCOPUS databases, monographs published in international publishing houses, plenary presentations in international scientific conferences, etc.). Research production of both levels is evaluated in points, which are later used for formula funding of research institutions from the state budget. Research production is evaluated every three years. Though formula funding seems to be a relatively objective exercise, it permanently evokes disputes between different interest groups. There are always heated discussions about the "fair" proportion of distribution between "hard" and "soft" sciences. Research institutes always complain that for them research funding is the only source of income, while universities have a number of other alternatives. There was a decade-lasting debate about which international research databases should be considered as valid in assessing the research production. Several lists of databases, approved by the Lithuanian Research Council, where compiled, though finally the list was shortened to the two main databases—Clarivate Analytics and SCOPUS. There are also continued debates about the usage of the Lithuanian scientific language. English has become the premier language of business and the professions and the only global language of science, research and academic publication (Marginson, van der Wende, 2007). Researchers are highly motivated to publish in English and there are worries that Lithuanian scientific language is increasingly becoming second-rated. The peer-review evaluation model was developed following the British example. However, a small country has its own peculiarities, as there are few scientists working in specific research areas, and it's difficult to avoid the conflict of interests. Though formally the peer-review is anonymous, it's often easy to identify which colleague wrote the article. The practice of inviting foreign experts is expensive, and, of course, a number of important publications (e. g. monographs about Lithuanian literature and history) are still written in Lithuanian.

Quality Assurance and Institutional Evaluation

The 1991 Law on Higher Education granted Lithuanian HEIs institutional autonomy and gave a start to a short but interesting period of academic freedom, when Soviet regulations concerning higher education were canceled, and new regulations were not created. HEIs launched a variety of new study programs with catchy names without having much expertise or specialists to teach. Soon it became clear that this absolute "freedom to teach" can not last for long, and in 1995 the government established the Centre for Quality Assurance in Higher Education. The mission of the centre was to accredit new and assess the ongoing study programs. Methodology of evaluation and assessment was borrowed from abroad. The centre appointed groups of experts for the assessment of each study program. Experts studied self-evaluation reports, participated in on-site visits, assessed the infrastructure and the teaching corps, explored the needs of labour market and employment possibilities of graduates, etc. The officially declared purpose was to provide HEIs with expertise, help and support. However, soon the punitive nature of the assessment became evident. Institutions, which sincerely listed challenges and shortcomings of the study programs in their self-evaluation reports, soon found out that experts tend to copy them in their final reports and present them as an argument in case of negative assessment. Eventually the authors of self-evaluation reports abandoned the practice of critical self-analysis and switched to the well-remembered from the Soviet period method of showing-off, which in Russian slang language is called "pokazucha". The dates of the site visit are negotiated beforehand. Before the visit the faculty administration started to organize preliminary meetings with the staff and the students and trained them to give the "right" answers during the forthcoming discussion with the experts. Another problem is related to the limited size of the country and national higher education sector. It appeared that it's difficult to avoid the conflict of interests when selecting a group of experts. In a small country everybody knows each other, and often the expert has to evaluate either a partner institution or his/her rivals. One of the options is inviting foreign experts, who usually face no conflict of interests. However, then the costs of assessment increase significantly. For the purpose of reducing the costs, often the centre for quality assurance of one Baltic country just invites experts from the other two. In order to save time and resources a new scheme was introduced several years ago. According to the scheme instead of the experts started to assess not a single study program, but the whole group of study programs (e. g., the group of social sciences). The assessment experiment caused confusion in some areas of studies. There were cases when the group of study programs was not accredited, but single study programs within that group still had valid accreditation (full accreditation of study program is valid for six years, temporary—for three years). Administration of universities could't understand on what grounds the group assessment of study programs can terminate the

accreditation of valid single programs and asked for a legal explanation. Finally in 2018 the Constitutional Court ruled out that decisions to terminate accreditation of single study programs which already had valid accreditation for the forthcoming years are anticonstitutional [Lietuvos Respublikos Konstitucinis Teismas 2018].

In 2005 the Centre for Quality Assessment in Higher Education initiated the EU-funded project of creating a system of institutional evaluation in higher education. With the assistance of foreign partners the methodology of institutional evaluation was developed and in 2010 the Ministry of Education and Science granted the Centre for Quality Assurance in Higher Education the right to start institutional evaluation of HEIs. After getting acquainted with the self-evaluation report and site visit, the international group of experts has to make the assessment of four key areas of HE activities: management, quality assurance, research and studies, impact on regional and national development. Experts also evaluate the resource base of HE institution. In case of positive evaluation institutional accreditation is granted for the period of 7 years. If at least one of the key areas receives negative evaluation, temporary accreditation is granted for 3 years, and in case of second negative evaluation HEI has to terminate its activities [Studijų kokybės vertinimo centras 2020]. The system of institutional evaluation is punitive in its nature, and for that reason one can hardly expect a trustworthy relationship between the Centre of Quality Assurance in Higher Education and HEIs. No wonder that HEI representatives look upon the group of visiting experts with fear and suspicion. In addition to that, one can observe cases of applying double standards in making decisions on institutional accreditation. E. g., Lithuanian University of Educational Sciences was subject to the second negative evaluation and was forced to merge with another university in order to continue the teacher training study programs. European Humanitarian University, which emigrated from Minsk in 2005 because of the conflict with the country authorities and offers study programs for Byelorussian students, also received the second negative evaluation, but for political reasons as an exception the government granted the university the right to continue the studies. In order to avoid biased decisions of local accreditation authorities, some universities prefer to get accreditation from the European University Association or other internationally acknowledged accreditation agencies.

University Rankings

The tradition of ranking universities in Lithuania can be traced back to late 1990s. The first ranking attempts, based on few evaluation criteria (numbers of students and study programs, research production, etc.) were undertaken by several privately-owned newspapers and journals („Veidas“ and „Verslo žinios“). The authors of these rankings were journalists: no wonder that they were subject to continuous critique by higher education authorities as well as the academic com-

munity. Some universities just refused to provide data for these kinds of league tables, and journalists in retaliation placed them in the lowest ranking places. The first attempt to construct a professional ranking system was undertaken in 2006, when a group of researchers from four Lithuanian universities together with their Western partners completed a EU-funded research „Capacities of Universities to Implement Masters Studies" (Studijų kokybės vertinimo centras, 2006). According to the designed ranking model universities were distributed into three categories: A—strong universities, B—medium universities, and C—weak universities. The ranking criteria were: quality of student enrolment, quality of studies, research potential, research production, resources and infrastructure, community service and public relations, management and planning, institutional prestige. The process of ranking revealed 5 strong universities, 5 medium universities and 5 weak universities (at that time there were 15 state universities in the country. Private universities were not ranked). The ranking exercise aroused stormy reactions of critique and dissatisfaction, mainly coming from universities which were classified as weak. Nevertheless in 2010 the Ministry of Education and Science approved the EU-funded project „Design and Implementation of the Ranking System of Lithuanian HEIs" with the overall budget of 2,5 mln litas (about 720000 euro). After the unprecedented wave of protests the project was canceled and the idea of creating state-funded and state-run ranking system of HEIs on a governmental level was never raised again. The privately-owned journal „Reitingai" continues the ranking tradition and twice a year publishes rankings of university study programs. Lithuanian universities are also visible in a number of international university ranking schemes. Vilnius University is a national leader in all international university rankings (ranked 458 in QS World University Rankings, ranked 601–700 in Academic Ranking of World Universities, ranked 750 in Webometrics, ranked 801–1000 in Times Higher Education World University Rankings). The other two universities which are ranked in international university rankings are: Vilnius Gediminas Technical University (ranked 591–600 in QS World University Rankings, ranked 1328 in Webometrics) and Kaunas University of Technology (ranked 1000+ in Times Higher Education World University Rankings). QS World University Rankings perhaps is the best known and most often referred university ranking in Lithuania. In QS Emerging Europe and Central Asia Rankings Vilnius University is ranked in the 18th place, below leading Russian, Estonian and Polish universities, but above Byelorussian, Ukrainian and Latvian universities (QS World University Rankings, 2020). Lithuanian universities also participate in the European U-Multirank ranking system. One of the benchmarks of the State Education Strategy for the years 2013–2022 is to have at least one university among top 500 universities in the Academic Ranking of World Universities [Lietuvos Respublikos Seimas 2013]. In practice the place of Lithuanian universities in international rankings has no legal, finan-

cial or other implications. It's up to universities to decide whether to participate in international ranking schemes and to what extent to treat the ranking exercise in a serious manner. Usually universities use their place in international university rankings for the marketing purposes.

Discussion and Conclusions

Transition in Lithuanian higher education can be characterized as a hasty and radical process. All the above mentioned changes were implemented during the first decade of the independent statehood. One can assume that 1990s was the most favourable period for educational reforms, when the belief in the supremacy of the Western educational model was almost universal and all new approaches suggested by the Western experts were accepted without any critical reflection. Besides that, the perspective of the EU accession forced the country to speed-up with the reform implementation. Rado [2001] noted that the problem of educational transformation in Central and Eastern Europe was that the process of change was compressed into a very short period of time. Therefore there was no space and time to properly place educational goals within its environment. Of course, eventually the new developments, including the centralized system of student admission, the three-level stydy cycle, performance-based funding and mechanisms of quality assurance, made the Lithuanian system of higher education more compatible with other systems in the EU and beyond. However, the rationale, the mode of implementation and, quite often, the final results of reforms differed from similar transformations of higher education in other countries. Centralized school-leaving exams exist in many EU member states, including Finland, which is often praised for its effective education system [Sahlberg 2015]. In Lithuania the argument of educational effectiveness was also declared as the main purpose of reforming the examination system: the new system enabled upper secondary school graduates who wanted to be admitted to universities and colleges to take one set of examinations instead of two. However, we assume that the main reason for reforming the examination system was the lack of trust: HEIs didn't believe in the objectivity of results of school-based examinations. Since Soviet times there was also a lack of trust for entrance examinations because of real or imaginary cases of corruption involved in the process of student admission. A centralized system where the possibility of cheating was minimized apparently satisfied all major interest groups. Current discussion about possible alternatives to maturity examinations demonstranted that the issue of trust is still high on the agenda. The Bologna process and introduction of competence-based learning contributed to further unification of higher education. Bologna initiative can be viewed as an example of making European higher education more standardised, comparable, accountable and cost-effective. The European Commission sees higher education in terms of a knowledge industry, whose products should compete against similar prod-

ucts in the global marketplace [Tomusk 2004]. A set of competencies for a certain profession is developed in response to the needs of the labour market, so in fact competence-based learning is not a student-centered, as it's officially declared, but a market-centered approach to higher education [Želvys, Akzholova 2016]. Post-socialist ountries, including Lithuania, which had a long-lasting experience of a unified Soviet higher education model, willingly accepted the labour market-driven and standards-led Bologna initiative. Striving to control the system via greater standardisation and accountability (just like during the „old good Soviet times") is one of the many manifestations of path-dependency in education. The introduction of instruments of quality assurance, borrowed from Western higher education agencies, initially was supposed to help HEIs to improve the quality of studies. However, almost from the very begining the system of quality assurance was transformed into a punitive instrument. The national quality assurance system urges to terminate study programs which have certain quality problems and otherwise could be improved with some additional help and support. With the introduction of institutional accreditation the threat of possible negative consequences of evaluation challenges the very existence of HEI. One of the possible explanations of the punitive nature of the quality assurance system is its cost-effectiveness. Evidently it's cheaper to close down the study program instead of investing additional human and material resources for its further improvement. The Soviet system of education was highly centralized and standardized, therefore one of its advantages was that it was relatively cost-effective: the unified model is the cheapest one because it doesn't provide alternative paths which increase the overall costs. Therefore the current neoliberal ideas of cost-effectivness in education were eagerly accepted by national policy makers as they seemed quite rational and appropriate in a situation of limited financial resources. The same applies to the model of performance-based funding. The model is based on the assumption that research in HEIs must be cost-effective: not only in a sense of getting income from R&D projects, but also in publishing in high-status research journals with the lowest possible costs. University rankings is another example of market approach in education: league tables can act as a powerfull marketing instrument. Therefore it's quite natural that many university ranking schemes are developed not by governmental agencies, but by commercial structures. It also means further standardisation as HEIs are ranked by applying some common evaluation criteria. It seems rather surprising that Lithuanian government eventually abandoned the plans of making university ranking a formal instrument of measurement. However, it was the outcome of political struggle between major political parties and not as a result of a thorough education policy analysis. In some other post-socialist countries the rank of the university in a league table is a rather important quality indicator and can determine the amount of state funding.

Lack of trust and support in post-socialist higher education is inherited from the past. A trend of measuring, controlling and making institutions accountable and cost-effective has its roots both in the former Soviet command system and in the current manifestations of new public management. These are just some of the examples of educational development where the heritage of Soviet-type socialism successfully coexists with contemporary Western neoliberalism.

References

Anweiler O. (1992) Some Historical Aspects of Educational Change in the Former Soviet Union and Eastern Europe. *Education and Economic Change in Eastern Europe and Former Soviet Union* (eds D. Phillips, M. Kaser), Wallngford: Triangle Books, pp. 29–39.

Arnove R. F., Franz S., Torres C. A. (2013) Education in Latin America: From Dependency and Neoliberalism to Alternative Paths to Development. *Comparative Education. The Dialectic of the Global and the Local* (eds R. F. Arnove, C. A. Torres, S. Franz), Plymouth: Rowman & Littlefield Publishers, pp. 315–339.

Bain O. (2010) Education after the Fall of the Berlin Wall: The End of History or the Begining of Histories? Re-Discovering Post-Socialism in Comparative Education. *Post-Socialism Is not Dead: (Re)Reading the Global in Comparative Education* (ed. I. Silova), Bingley: Emerald Publishing, pp. 27–57.

Bauman Z. (2007) *Liquid Times: Living in an Age of Uncertainty*. Cambridge: Polity.

Bethel G., Zabulionis A. (2000) *Examination Reform in Lithuania*. Vilnius: National Examination Centre.

Būdienė V., Zabulionis A. (2006) Country Reports. Lithuania. *Education in a Hidden Marketplace: Monitoring of Private Tutoring* (eds I. Silova, V. Būdienė, M. Bray), Budapest: Education Support Program (ESP) of the Open Society Institute, pp. 211–235.

Carnoy M. (1999) *Globalization and Educational Reform: What Planners Need to Know*. Paris: UNESCO Institute for Educational Planning.

Castells M. (2001) *The Rise of the Network Society*. Chichester: Wiley-Blackwell.

Chankseliani M., Silova I. (2018) Reconfiguring Education Purposes, Policies and Practices during Post-Socialist Transformations: Setting the Stage. *Comparing Post-Socialist Transformations. Purposes, Policies and Practices in Education* (eds M. Chankseliani, I. Silova), Oxford: Symposium Books, pp. 7–25.

Chapman C., Muijs D., Reynolds D., Sammons P., Teddlie C. (2016) *The International Handbook of Educational Effectiveness and Improvement: Research, Policy and Practice*. New York: Routledge.

Daujotis V., Radžvilas V., Sližys R. P., Stumbrys E. (2002) *Lietuvos mokslo politika Europos kontekste* [Lithuanian Science Policy in the European Context]. Vilnius: Justitia.

Daujotis V., Janulaitis A., Radžvilas V., Sližys R. P. (2012) *Nepriklausomos Lietuvos aukštojo mokslo vargdenė* [Vargdenė of Independent Lithuanian Higher Education]. Vilnius: Petro Ofsetas.

Fullan M. (1993) *Change Forces. Probing the Depths of Educational Reforms*. Abingdon: RoutledgeFalmer.

Gonzalez J., Wagenaar R. (eds) (2008) *Universities' Contribution to the Bologna Process. An Introduction*. Bilbao: Publicaciones de la Universidad de Deusto.

Haregreaves A. (1998) *Changing Teachers, Changing Times. Teachers' Work and Culture in the Postmodern Age*. New York: Teachers College.

Herkenrath M., Konig C., Scholtz H., Volken T. (2005) Convergence and Divergence in the Contemporary World System. An Introduction. *International Journal of Comparative Sociology*, vol. 46, no 5–6, pp. 363–382.

Huisman J., Smolentseva A., Froumin I. (eds) (2018) *25 Years of Transformations of Higher Education Systems in Post-Soviet Countries*. Cham: Palgrave McMillan.

Lamanauskas V. (2010) Mokslinės veiklos vertinimas: tarp kokybės ir mokslo imitavimo [Evaluation of Scientific Activities: Between Quality and Science Simulation]. *Švietimas: politika, vadyba, kokybė*, vol. 3, no 6, pp. 4–9.

Leišytė L., Rose A.-L., Schimmelpfenning E. (2018) Lithuanian Higher Education between Path-Dependency and Change. *25 Years of Transformations of Higher Education Systems in Post-Soviet Countries* (eds J. Huisman, A. Smolentseva, I. Froumin), Cham: Palgrave McMillan, pp. 285–310.

Leišytė L., Želvys R., Zenkienė L. (2015) Re-Contextualization of the Bologna Process in Lithuania. *European Journal of Higher Education*, vol. 5, no 1, pp. 49–67.

Leišytė L., Rose A.-L, Želvys R. (2019) Higher Education Reforms in Lithuania. Two Decades after Bologna. *Higher Education System Reform. An International Comparison after Twenty Years of Bologna* (eds B. Broucker, J.C. de Wit, L. Leišytė), Leiden: Brill Sense, pp. 179–195.

Lietuvos Respublikos Konstitucinis Teismas [Constitutional Court of the Republic of Lithuania](2018) *Dėl studijų krypčių vertinimo ir laikino akreditavimo* [On the Evaluation and Provisional Accreditation of Study Directions]. Available at: https://www.lrkt.lt/lt/teismo-aktai/paieska/135/ta1838/content (accessed 20 July 2020).

Lietuvos Respublikos Seimas [Seimas of the Republic of Lithuania] (2013) *Valstybinė švietimo 2013–2022 metų strategija* [State Strategy for Education 2013–2022]. Available at: https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.463390 (accessed 20 July 2020).

Lynch K. (2015) Control by Numbers: New Managerialism and Ranking in Higher Education. *Critical Studies in Education*, vol. 56, no 2, pp. 190–207.

Marginson S., van der Wende M. (2007a) *Globalisation and Higher Education. OECD Education*

Working Papers No 8. Paris: OECD. Available at: http://dx.doi.org/10.1787/173831738240 (accessed 20 July 2020).

Marginson S., van der Wende M. (2007b) To Rank or To Be Ranked: The Impact of Global Rankings in Higher Education. *Journal of Studies in International Education*, vol. 11, no 3/4, pp. 306–329.

MOSTA (2019) *Beveik pusė Vilniaus dvyliktokų naudojasi korepetitorių paslaugomis* [Almost Half of Vilnius Twelfth-Graders Use the Services of Korepetitors]. Available at: https://strata.gov.lt/lt/naujienos/8-naujienos/536-puse-vilniaus-dvyliktok-naudojasi-korepetitori-paslaugomis (accessed 20 July 2020).

MOSTA (2018) *Lietuvos mokslo, studijų ir inovacijų būklės apžvalga* [Overview of the State of Science, Studies and Innovation in Lithuania]. Vilnius: MOSTA.

Niemczyk E. K. (2019) Glocal Education in Practice: Teaching, Researching, and Citizenship. *Glocal Education in Practice: Teaching, Researching, and Citizenship* (eds N. Popov et al.), Pomorie: Bulgarian Comparative Education Society, pp. 11–18.

OECD (2002) *Reviews of National Policies for Education. Lithuania*. Paris: OECD.

OECD (2017) *Reviews of National Policies for Education. Education in Lithuania*. Paris: OECD.

Page S. (2001) Ranking Canadian Universities: A New Marketing Tool. *Journal of Marketing for Higher Education*, vol. 10, no 2, pp. 59–69.

Pranckūnienė E. (2016) Pasitikėjimo fenomenas švietimo politikoje [The Phenomenon of Trust in Education Policy]. *Pedagogika*, vol. 123, no 3, pp. 139–147.

QS World University Rankings (2020) QS University Rankings: Emerging Europe and Central Asia. Available at: https://www.topuniversities.com/university-rankings/eeca-rankings/2020 (accessed 20 July 2020).

Rado P. (2001) *Transition in Education. Policy Making and the Key Educational Policy Areas in the Central-European and Baltic Countries*. Budapest: Open Society Institute.

Rasmussen P. (2003) Global Change and Internationalisation of Education. *Education Policy and the Global Social Order* (ed. P. Rasmussen), Aalborg: Centre for the Interdisciplinary Study of Learning, Aalborg University.

Robertson R. (2012) Globalisation or Glocalisation? *The Journal of International Communication*, vol. 18, no 2, pp. 191–208.

Sahlberg P. (2015) *Finnish Lessons 2.0: What Can the World Learn from Educational Change in Finland?* New York: Teachers College.

Semyonov D., Platonova D. (2018) Preface: Challenges and Advantages of Exploring Post-Soviet Higher Education. *25 Years of Transformations of Higher Education Systems in Post-Soviet Countries* (eds J. Huisman, A. Smolentseva, I. Froumin), Cham: Palgrave McMillan, p. vii.

Silova I. (ed) (2010) *Post-Socialism is not Dead: (Re)Reading the Global in Comparative Education*. Bingley: Emerald.

Silova I. (2012) Contested Meanings of Educational Borrowing. *World Yearbook of Education 2012: Policy Borrowing and Lending in Education* (eds G. Steiner-Khamsi, F. Waldow), New York: Routledge, pp. 229–245.

Silova I., Piattoeva N., Millei Z. (eds) (2018) *Childhood and Schooling in (Post) Socialist Societies. Memories of Everyday Life.* Cham: Palgrave McMillan.

Sližys P. (2012) Keli dabartinės mokslo ir studijų sistemos raidos bruožai. Mokslinės demokratijos samprata [Some Features of the Development of the Current System of Science and Study. The Concept of Scientific Democracy]. *Nepriklausomos Lietuvos aukštojo mokslo vargdenė* [Vargdenė of Independent Lithuanian Higher Education] (eds V. Daujotis, A. Janulaitis, V. Radžvilas, R. P. Sližys), Vilnius: Petro Ofsetas, pp. 9–31.

Spring J. (2009) *Globalization of Education. An Introduction*. New York: Routledge.

Steiner-Khamsi G. (ed.) (2004) *THe Global Politics of Educational Borrowing and Lending*. New York: Teachers College.

Steiner-Khamsi G., Waldow F. (eds) (2012) *Policy Borrowing and Lending in Education*. New York: Routledge.

Studijų kokybės vertinimo centras (2006) *Universitetų pajėgumas vykdyti magistrantūros studijas* [Capacity of Universities to Carry out Postgraduate Studies] Vilnius: Studijų kokybės vertinimo centras.

Studijų kokybės vertinimo centras (2019) *Všį „Europos humanitarinio universiteto" paraiškos dokumentų leidimui vykdyti studijas ir su studijomis susijusią veiklą vertinimo išvados* [Conclusions of the Evaluation of the Application for Permission to Conduct Studies and Study-Related Activities of the Public "European Humanities University"]. Available at: https://www.skvc.lt/uploads/documents/files/Kokyb%C4%97s%20u%C5%BEtikrinimas/Parai%C5%A1kos%20leidimui%20vykdyti%20studijas/Vertinimo%20i%C5%A1vados/EHU_vertinimo_isvados.pdf (accessed 20 July 2020).

Studijų kokybės vertinimo centras (2020) *Aukštųjų mokyklų vertinimas* [Assessment of Higher Education] Available at: https://www.skvc.lt/default/lt/kokybes-uztikrinimas/aukstuju-mokyklu-vertinimas/am-procesas (accessed 20 July 2020).

Szolar E. (2015) Change, Continuity and Path-Dependency in Hungarian Public Education. *European Educational Research Journal*, vol. 14, no 3–4, pp. 331–346.

Tomusk V. (2004) Three Bolognas and a Pizza Pie: Notes on Institutionalization of the European Higher Education System. *International Studies in Sociology of Education*, vol. 14, no 1, pp. 75–95.

UNDP (2020) Human Development Index Trends, 1990–2018. Available at: http://hdr.undp.org/en/content/table-2-human-development-index-trends-1990%E2%80%932018 (accessed 20 July 2020).

Želvys R. (2004) Development of Lithuanian Higher Education Policy in a Global Context: To What Extent Can We Manage Change? *Higher Education Facing Globalization and Europeanization* (eds A. Tjeldvoll, P. Jucevičienė, B. Janiūnaitė, I. Cesevičiūtė), Kaunas: Technologija, pp. 135–141.

Želvys R., Akzholova A. (2016) Challenges of Applying Competence-Based Learning in Higher Education. *Acta Paedagogica Vilnensia*, no 36, pp. 9–17.

Židžiūnienė A. (2018) Ar brandos darbas atspindės asmeninę brandą? [Will the Work of Maturity Reflect Personal Maturity?] *Švietimo naujienos*. Available at: http://www.svietimonaujienos.lt/ar-brandos-darbas-atspindes-asmenine-branda/ (accessed 20 July 2020).