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Patterns of First-Graders' Development at the Start of Schooling: Cluster Approach

Based on the Results of iPIPS Project

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Abstract. The first year at school is crucial for determining further academic achievement. Information on the range of first-graders' abilities and needs and prediction of their educational trajectories allow the education system to facilitate adaptation to school dramatically and increase the efficiency of teaching approaches. The article presents the results of a survey of 7,778 first-graders enrolled in schools in four Russian cities—Moscow, Naberezhnye Chelny, Sevastopol and Tambov—in 2015. Cluster analysis of the data on children's cognitive skills (manifested in mathematical and reading literacy) and non-cognitive (personal, social and emotional) development produced four groups of first-graders with typical patterns of development assessed at school entry. Combining cognitive and non-cognitive indicators creates an additional opportunity for understanding the peculiarities of child development in elementary school and allows for building a "gallery" of four typical first-grader profiles. The findings can be used in helping teachers choose and customize education programs and other means of supporting children during adaptation.

Keywords: first graders, iPIPS, baseline assessment, progress measurement, cognitive development, non-cognitive development, cluster analysis.

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Starting school is a critical period in a child's life. Academic achievement and overall wellbeing at school will largely depend on how well the child and the school adapt to each other [Margetts 2009, Alexander, Entwisle, Dauber 1993, Domitrovich et al. 2017; Zuckerman, Polivanova 2012]. In order to provide relevant support to children at this crucial point, it is necessary to understand what skills and pre-developed patterns of cognitive and non-cognitive development first-graders bring to school, on the one hand, and what the school can offer to enhance their academic achievement and support their overall wellbeing, on the other hand.

For the first time in the history of Russian education, the Federal State Education Standard of Primary Education includes legally defined personal outcomes as a goal of general education. Of course, personal, social, and emotional skills as important aspects of development and later achievement in life have been objects of measurement for quite a while [Durlak et al. 2011; Poropat 2009; OECD2015]. However, bringing the issue to the legislative field added fuel to the debate over competent (valid and reliable) assessment of personal, social, and emotional skills and displayed the shortage of modern instruments that would be structured intricately enough (to fit the structure of the object measured), have a high predictive validity, and, most valuably, be effective in helping teachers choose and customize education programs and other means of supporting children's adaptation to school. In fact, teachers themselves need reliable and accurate diagnostic tools to adapt to the development peculiarities of their students.

Once the cognitive, personal, social, and emotional skills have been assessed, there will be enough information to understand the specific aspects of children's situations, their capabilities and needs. Research shows that cognitive and non-cognitive development (personal and socioemotional skills) at the early stages of education is a powerful predictor of further academic performance and success in adult life [Kautz et al. 2014]. This is not to say that preschool development, child's adaptation skills and parenting practices should be underestimated.

Evaluating preschool and elementary school-aged children is fraught with particular difficulties. First of all, children at this age cannot stay focused for a long time. Second, many of them cannot read when they first come to school, so general questioning techniques will hardly be applicable here. Third, any evaluation should take into account the size of vocabulary and the overall level of language development to make sure the child understands the instructions and tasks [Merrell, Tymms 2016]. That is why the content and forms of child assessment at this period of development have certain limitations [Slentz 2008].

There are not so many school-entry assessments with established psychometric properties in global psychodiagnostics that would be suitable for large-scale testing. A proportion of the educational community is convinced that children should be assessed through ob-

servations and adult surveys, whereas others believe that even the youngest can and should be interviewed. For instance, the well-known *Early Development Instrument* (EDI) represents a questionnaire completed by preschool teachers that measures the level of child development across various domains [Janus et al. 2007]. The *Early Childhood Environment Rating Scales* (ECERS) and the *School-Age Care Environment Rating Scales* (SACERS) are based on observations and structured assessments of environment, time management, student-teacher interactions, and education quality [Harms, Clifford, Cryer 2015; Harms 2013]. These are indirect assessment tools which describe the environment of child development using the observations made by the adults involved.

This article is based on a study that uses the *international Performance Indicators in Primary School* (*iPIPS*), which allow for evaluating cognitive (basic reading and mathematical literacy) and non-cognitive (personal, social, emotional) development of children at school entry. Unlike the questionnaires mentioned above, the iPIPS were designed specifically to assess first-graders directly. Assessors work with children in individual one-to-one sessions, which allows them to measure the level of their knowledge and skills at school entry as well as the progress they make by the end of their first year at school [Ivanova, Nisskaya 2015]. The instrument offers computer-delivered interactive assessment using an adaptive algorithm so that assessment is not too difficult for each individual child and does not get them tired or demotivated. The iPIPS also include a questionnaire for teachers and parents on how children grow and develop.

The iPIPS have been widely used abroad for both practical and research purposes, allowing teachers to get to know their first-graders better. Experts use the iPIPS to collect important statistics to study various educational situations. In particular, the instrument has been applied to measure the role of preschool education in later attainment [Tymms, Merrell, Henderson 1997], identify children's individual and group progress [Tymms, Merrell, Henderson 2000], compare first-graders' progress across countries [Copping et al. 2016; Tymms, Merrell, Wildy 2015], and identify the high-risk groups [Tymms et al. 2012].

Russian researchers have used iPIPS to explore regional differences in first-graders' skills measured at school entry [Ivanova et al. 2016], analyze progress in reading literacy [Antipkina, Kuznetsova, Kardanova 2017], assess the role of phonological awareness [Kuzmina, Ivanova, Antipkina 2017], and monitor the socioemotional development of children and their behavioral patterns [Orel, Ponomareva 2018; 2016]. This article presents a large-scale iPIPS-based empirical study to describe a 2015 cohort of first-graders, analyze the patterns of combinations of cognitive and non-cognitive (socioemotional) skills observed in first-graders at school entry, and create a "gallery" of four typical first-grader profiles.

1. Criteria for identifying levels in cognitive and non-cognitive development

In assessing cognitive skills at school entry, the focus should be placed on the skills that are directly related to the first-grade curriculum and capable of predicting later achievement. Greg J. Duncan and his colleagues [Duncan et al. 2007] used six longitudinal studies conducted on representative samples in different countries to demonstrate that mathematical and reading literacy measured at school entry are the best predictors of academic performance at the end of elementary school. Those studies found no differences related to gender or socioeconomic status. Canadian researchers later reproduced the data analysis strategy used by Duncan and his colleagues on a sample of Quebec children and obtained very similar results, confirming the high prognostic value of initial reading and mathematical skills for progress by the middle of elementary school [Pagani et al. 2010]. They also added fine motor skills as a predictor to the model and revealed, in contrast to Duncan□s findings, noticeable gender differences in its significance. A number of minor studies also confirmed the prognostic role of early reading [Müller, Brady 2001] and mathematical [Manfra et al. 2017; Jordan et al. 2009] skills, the assessment of which should take into account the socioeconomic status and other relevant contexts such as ethnicity, type and location of school, etc.

Ample research has confirmed over and over again that personal and socioemotional skills affect various aspects of life at any age [OECD2015; Durlak et al. 2011]. The lack of such skills poses risks to child development [Domitrovich et al. 2017]. Important and distinctive features of all such skills include: (a) conceptual independence from cognitive competencies, (b) overall benefit to an individual in cases where such characteristics are distinctly manifested, (c) relative temporal stability provided there is no external interference, (d) possibility of changing as a result of interference, and (e) situational manifestations [Duckworth, Yeager 2015].

Psychopedagogical studies involving elementary pupils stress the importance of a comprehensive approach to assessments [Merrell, Tymms 2011]. Measuring the cognitive and non-cognitive development of first-graders provides for an integrated evaluation of children's skills, increasing the opportunities for analysis and interpretation of results and expanding the choice of support tools.

Russian researchers have studied some of the aspects of readiness for school and adaptation of first-graders, in particular their physiological readiness [Paranicheva, Tyurina 2012; Gritsinskaya et al. 2003], overall development and ability to follow the rules [Kovaleva et al. 2012; Salnikova, Tkachenko 2012], motivation for learning [Gani, Gani 2009], and adaptation as a challenge in life [Gagay, Grineva 2013]. However, with some minor exceptions [Kovaleva et al. 2012], most of such studies use samples of no more than a few hundred children.

This paper investigates (i) the level of development of cognitive and non-cognitive skills in Russian children at school entry and (ii) the

possibility of identifying empirically distinct groups (clusters) of children with similar profiles of cognitive and non-cognitive development.

2. Method

2.1. Description of the instrument and the research procedure

Cognitive and non-cognitive development of children was evaluated using the iPIPS instrument originating from Durham University, Great Britain [Tymms 1999]. The instrument allows for assessing children at school entry and monitoring their individual progress made during the first school year. This article only uses the baseline assessment results.

The iPIPS were selected as a research method for specific reasons. First, they are well in line with the latest achievements in global research on assessments. Second, this is a high-quality, world-recognized standardized instrument with established psychometric properties and validity. Third, they use a special measurement technique to assess individual progress made by a child throughout the first year of schooling. Finally, the iPIPS are designed as a computer adaptive assessment, which makes it possible to evaluate each individual child as carefully and accurately as possible, avoiding bias.

The National Research University Higher School of Economics (HSE) in cooperation with Durham University developed a Russian version of the iPIPS in 2013–2014 [Hawker, Kardanova 2015; Ivanova, Nisskaya 2015]. Given that the school starting age differs in Great Britain and Russia (Russian first-graders are on average two years older), the instrument had to undergo an essential adaptation. In particular, new tasks were designed to match the age and cultural contexts of the development of Russian children. The resulting Russian version of the iPIPS has been successfully applied in Russian schools.

The iPIPS instrument is unique in that it offers a holistic approach, assessing not only cognitive but also socioemotional development of a child. In addition, it makes use of the contextual information on the conditions of children's preschool life and development, their families, and adopted child-rearing practices. Special attention is paid to school teaching methods.

The cognitive development module consists of the following measures:

- Handwriting (assessment of writing skills)
- Vocabulary (passive vocabulary and knowledge of high-frequency words)
- Phonological awareness
  - Word repetition (familiar and unfamiliar words as well as non-words)
  - Rhyming (supported by pictures of rhyming words)
- Ideas about reading:
  - Text structure (knowledge of capital and lowercase letters, the notions of the beginning and end of a sentence, periods, etc.)
  - Letter knowledge

  - Word reading (written word recognition)
  - Short story reading (text decoding)
  - Reading comprehension
- Ideas about mathematics:
  - Simple counting (counting objects in a picture)
  - Simple adding and subtracting (supported by pictures)
  - Number knowledge
  - Mathematical problems (logical problems, problems with and without symbols, word problems, contextual problems)

First-graders are not required to possess knowledge in any of the domains listed above—it is the school's objective to develop them relevant skills in these. In reality, however, many children have already developed some reading, counting and writing skills by the time they first come to school, so it becomes vital to know the level of each child's development at school entry in order to make any justified assessment of their progress.

The assessment is designed as an exploratory game to ensure as safe and comfortable environment for a child as possible. An interviewer, whose role may be played by a pre-briefed school teacher, psychologist or counselor, assists each individual child in the computer adaptive assessment, which takes about 20–30 minutes (depending on the child's level of development). The child follows the software instructions voiced by a professional speaker and performs a series of entertaining tasks, while the interviewer records the answers. The versatility of the tasks prevents children from getting bored or tired. The semi-adaptive algorithm selects items that match each individual child's abilities.

Non-cognitive development is assessed using a questionnaire completed by teachers from their knowledge of children gained through day-to-day interaction and observation. Teachers are asked to evaluate every child using a five-point scale in all items. A descriptor is provided for each point on the scale so that teachers could choose a suitable example and decide which descriptor provides the closest match for their observation.

The following personal and socioemotional skills are assessed by the iPIPS: adjusting to school environment; independence and self-help skills; confidence and participation in group activities; ability to concentrate on the task under the teacher's guidance and independently; ability to think through one's decisions and avoid acting impulsively; ability to follow the rules and behave in accordance with the established code; communication skills (level of speech development and such socio-cognitive aspects of communication as ability to ask questions, hear out what others have to say, and wait for one's turn to speak); ability to interact with adults (to approach adults confidently and fearlessly and behave accordingly and naturally) and peers (to establish and maintain friendly relationships); awareness of the fact

Table 1. **Sample description**

City	No. of schools	No. of classes	No. of students	Proportion of students from schools of higher status	Percentage of girls
Moscow	16	140	3,173	N*	48%
Naberezhnye Chelny	41	94	2,379	18%	52%
Sevastopol	22	59	1,283	38%	49%
Tambov	5	37	943	39%	49%

*The assessment in Moscow involved school complexes to which the notion of "advanced type" is inapplicable.

that the way other people live may differ from what is accepted in the child's family, and having respect for such differences. These aspects of socioemotional development were selected due to their empirically-proved significance for school adaptation, friendship ties, and academic achievement [Merrell, Tymss, Buckley 2015; Spence 1987].

2.2. Sample

The empirical basis of the research consists of the iPIPS data obtained in 2015 on an extensive sample of first-graders in four large cities of Russia: Moscow, Naberezhnye Chelny, Tambov, and Sevastopol[1].

The iPIPS instrument may be used either to analyze system performance or as a means of assessing the individual progress of schoolchildren. In cases where the goal of the research is to analyze the education system at the level of a city or region, the sample should be large enough and representative of the respective city or region. If, however, research is aimed at thorough assessment of individual students in particular schools, the sample should embrace all first-graders at those schools and does not have to be representative.

Table 1 describes the sample of this study, which involved schools of different types (regular schools and higher-status schools such as gymnasiums, and specialized schools) located in different parts of the aforementioned cities. In Sevastopol and Naberezhnye Chelny, the sample unit was a class of students which was picked arbitrarily from the first-grade cohort of a selected school in a few municipal districts. In Moscow and Tambov, the sample unit was a school, so all the first-graders of a particular school were assessed.

[1] We are grateful to the Department of Education of Moscow, the Ministry of Education and Science of the Republic of Tatarstan, the Republican Center for Monitoring of Education Quality of the Republic of Tatarstan, the Department of Education of Sevastopol, the Department of Education and Science of Tambov Oblast, and the Institute of Advanced Educator Training of Tambov Oblast for their assistance in the research.

Even though the final sample features a great diversity of school types, it is not representative in every sense of the word (this is dwelled upon in the discussion part of the article).

2.3. Analysis Item Response Theory (IRT) was applied to build scales for the basic cognitive and non-cognitive skills. In particular, one-parameter dichotomous Rasch model [Wright, Stone 1979] was used to translate children's raw scores into assessments of their skills on cognitive scales (in mathematics, reading, phonological awareness, and vocabulary), while the non-cognitive components were assessed using the Rating Scale Model (RSM), an extension of the dichotomous Rasch model for Likert-type scales [Wright, Masters 1982]. Prior to assessment, psychometric characteristics of students were measured by conducting psychometric item analysis, dimensional analysis, and reliability analysis, and then building scales using Rasch models. Winsteps software was used to perform psychometric item analysis and assess item and ability parameters [Linacre 2011].

k-means clustering was used to group children based on their levels of cognitive and non-cognitive development. A correlation matrix of all the variables was constructed prior to clustering. In the cluster analysis, data is grouped based on response patterns. This particular study aimed at identifying groups of first-graders with similar levels of cognitive or non-cognitive development.

k-means clustering is one of the most intuitive and popular methods of response pattern assessment and grouping, yet its numerous limitations should be born in mind [Jain 2010]. For instance, unlike hierarchical cluster analysis, *k*-means clustering implies determining the optimal number of clusters prior to analysis. There are various ways of determining the number of clusters of data analyzed, like logical representation [Ibid.]. We expected four or five clusters to be concealed in the data: one cluster would reveal high performance in all the scales, low performance in all the scales in another, and two or three more clusters would presumably represent various combinations of scores reflecting dominant development of cognitive or non-cognitive skills. In order to test this hypothesis, attempts were made to divide the sample into three, four, and five clusters. Each of the solutions was discussed in terms of reasonable interpretability and balanced clustering.

Cluster analysis has some disadvantages, in particular it always provides a statistical classification even if there are no objective grounds for classifying. For this reason, stability of the resulting cluster solutions had to be verified in order to prove the internal validity of clustering results. First of all, the sample was randomly divided into two groups. Each of them was subjected to *k*-means clustering, and the results were compared to the master sample. In addition to that, temporal clustering stability and the stability of clusters for samples in other cities were verified using the iPIPS-2014 data. All the new clus-

ter solutions were found to be similar to the solution obtained for the master sample.

The resulting clusters (groups of students) were described using the following indicators:

1) Sociodemographic characteristics (gender, mother's education, number of books at home, preschool attendance)
2) Average score in phonological literacy and vocabulary

Chi-squared test and Cramer criterion were used to assess correlations between these parameters and the resulting groups of children. Differences among the clusters were also verified using standard statistical procedures for each indicator. Z-tests were applied to measure differences among the clusters in gender, mother's education, number of books at home (more or fewer than 100), and preschool attendance (nominal variables). Analysis of variance (ANOVA) was used to analyze the differences in vocabulary and phonological awareness among the groups.

3. Results

3.1. Assessment of cognitive development

Before going on to the secondary data analysis, it is necessary to make sure that the data is of high quality. For this purpose, psychometric analysis of initial assessment results was performed, which showed that all cognitive iPIPS items and the assessment as a whole have good characteristics. All the scales (mathematics, reading, phonological awareness, and vocabulary) are essentially unidimensional, and all the items comply with the model used. Cronbach's alpha is high for all the scales: 0.92 for mathematics, 0.97 for reading, 0.78 for phonological awareness, and 0.84 for vocabulary[2]. It thus follows that the scales can be used to measure cognitive skills of children at school entry.

Every child was introduced to four baseline assessments: in mathematics, reading, phonological awareness, and vocabulary. Table 2 presents descriptive statistics of students' results expressed in the logit scale[3]. Mean item complexity is set to zero for each scale as a reference point.

Below is a brief interpretation of low, medium and high scores in each of the scales.

Mathematics. Children who gained the minimum score in mathematics can name numbers up to ten and cope with the simplest calcu-

[2] For more details on the results of the psychometric analysis of the math scale, see [Ivanova et al. 2016].

[3] Logit is a special unit of measurement used in modern Item Response Theory.

Table 2. **Results of assessing the cognitive development of children at school entry**

Indicator	Mean	Standard deviation	Minimum	Maximum
Mathematics	–0.29	1.83	–7.44	7.24
Reading	0.94	2.41	–7.35	7.14
Phonological awareness	1.48	1.52	–4.84	4.33
Vocabulary	0.79	1.79	–5.41	5.36

lations supported by object pictures. Children in the mid-scale can name one- and two-digit numbers (with occasional mistakes), do simple calculations, solve easy logical and word problems, and do sums with mathematical symbols that do not cross the next ten. Children with the highest scores in mathematics can name multidigit numbers, do fairly complex additions and subtractions with two-digit numbers, and solve "real-life" problems.

Reading. A minimal score means that a child does not possess the basic reading skills, including letter knowledge. Average scores show that children know letters and can read but cannot always understand what they have just read. Children who score the highest have mastered the basic reading skills quite well, they can read a few successive texts without mistakes and comprehend what they have read.

Vocabulary. Children with the minimum scores in the vocabulary scale know and can recognize relatively simple, frequently used words. Average scores indicate that a child knows and can recognize less common and more complex words. Finally, the top scorers have a pretty sizeable vocabulary and are able to recognize some narrowly-specialized and uncommon words, such as *saxophone* or *silhouette*.

Phonological awareness. Although the phonological awareness scale is represented by relatively few tests of two types, it is good at differentiating students. A minimum score in this scale means that a child is only able to repeat simple and well-known words aloud. Those who score in the middle are able to repeat non-words, understand and recognize some unsophisticated rhymes. Children scoring maximum can repeat complex or unfamiliar words and non-words and rhyme words easily.

3.2. Assessment of non-cognitive development

Psychometric analysis shows that the non-cognitive development questionnaire includes two scales, conventionally referred to as "confidence" and "classroom behavior". Both are one-dimensional, with tasks in line with the model used, good psychometric characteris-

Table 3. **Results of assessing the non-cognitive development of children at school entry**

Scale	Mean	Standard deviation	Minimum	Maximum
Confidence	1.69	1.70	–5.34	5.59
Classroom behavior	0.98	2.33	–6.17	6.16

tics, and adequate response categories. Cronbach's alpha is 0.84 for confidence and 0.88 for classroom behavior. Therefore, both scales have good psychometric properties and can be used for assessment[4].

The classroom behavior scale describes behavioral skills: the ability to focus on the task and follow the school rules and schedules, and the level of cultural awareness, i. e. understanding that other people may have different lifestyles that should be respected. Minimum scores in this scale demonstrate that a child gets distracted a lot both under the teacher's guidance and when working by oneself, violates the established classroom rules, and acts impulsively. The highest score is associated with ability to focus for quite a while (about 15 minutes), staying within the established rules, and understanding that there are diverse cultural traditions that may be different from what is accepted in the child's family.

The confidence scale describes children's independence and autonomy skills, social skills for maintaining relationships with other people, age-mates and adults, at school and in broader social contexts. Children who score low on this scale feel uncomfortable in the school environment, miss their parents, need to ask for help with buttons or using the toilet, find it difficult to make friends at school, address adults inadequately or hesitate to approach them. Maximum scores are gained by children who are well-adapted, independent, possess necessary self-care skills, and communicate adequately with both adults and peers.

Scores in both scales, confidence and classroom behavior, have been obtained for every child. Table 3 contains the descriptive statistics of students' results expressed in the logit scale. Mean item complexity is set to zero for each scale as a reference point.

3.3. Preliminary analysis of children's differences in cognitive and non-cognitive development

The next step was to analyze how children's school-entry profiles varied depending on a number of basic sociodemographic and institutional factors: gender, parental (mother's) education, number of books at home, and preschool attendance. Tables 4–7 present the ef-

[4] For more details on the results of psychometric analysis of the non-cognitive development questionnaire scales, including questionnaire size analysis, see [Orel et al. 2016].

Table 4. **Results of girls and boys**

Indicator	No.	Mean		Standard deviation		Effect size
		Girls	Boys	Girls	Boys	
Mathematics	7,753	–0.15	0.14	0.90	1.07	–0.29
Reading	7,753	0.08	–0.07	0.98	1.01	0.15
Vocabulary	7,753	–0.09	0.09	1.00	0.99	–0.18
Phonological awareness	7,753	0.09	–0.09	0.99	1.00	0.19
Confidence	6,233	0.21	–0.20	0.98	0.98	0.41
Classroom behavior	6,233	0.29	–0.28	0.92	0.99	0.58

Table 5. **Correlations between children's results and their mothers' education**

Indicator	Mean		Standard deviation		Effect size
	No college degree	College degree	No college degree	College degree	
Mathematics	–0.25	0.14	0.97	0.98	0.39
Reading	–0.26	0.14	1.02	0.94	0.40
Vocabulary	–0.22	0.13	1.03	0.96	0.35
Phonological awareness	–0.24	0.13	0.96	0.99	0.38
Confidence	–0.13	0.08	1.01	0.99	0.21
Classroom behavior	–0.15	0.09	1.02	0.99	0.24

fects of belonging to a particular group, identified based on the factors specified, on the child's performance in every scale. The effect size is estimated as the proportion of standardized mean difference in the respective variable for two groups to the overall standard deviation for the group. The effect size of 0.2 is considered as insignificant (small), 0.5–0.8 as medium, and above 0.8 as large [Cohen 1988].

Table 4 breaks the figures down by gender. Dispersion is on average slightly higher among boys, which means that boys are more likely to score extremely high or extremely low. The gender gap is particularly wide in mathematics.

The effect of gender on reading, phonological awareness and vocabulary is insignificant. However, even though the effect is small in mathematics, it still proves that girls fall behind noticeably, by almost one third of a standard deviation. The medium-sized effect of gender in non-cognitive domains shows that teachers consider both behavior and confidence to be better developed in girls than in boys. The dif-

Table 6. **Children's results depending on the number of books at home**

Indicator	Mean		Standard deviation		Effect size
	Fewer than 100 books	100 books or more	Fewer than 100 books	100 books or more	
Mathematics	–0.10	0.18	0.98	0.99	0.28
Reading	–0.11	0.19	0.98	0.97	0.30
Vocabulary	–0.14	0.26	1.00	0.95	0.40
Phonological awareness	–0.10	0.18	0.98	0.99	0.28
Confidence	–0.03	0.07	0.99	1.00	0.10
Classroom behavior	–0.04	0.10	0.99	1.02	0.14

Table 7. **Results of children with and without preschool education experience**

Indicator	Mean		Standard deviation		Effect size
	Preschool attendance	No preschool attendance	Preschool attendance	No preschool attendance	
Mathematics	–0.02	0.00	1.05	0.98	0.02
Reading	–0.02	–0.01	1.13	0.97	0.02
Vocabulary	–0.02	0.00	1.10	0.99	0.02
Phonological awareness	–0.07	0.00	1.03	0.99	0.07
Confidence	–0.06	0.01	1.00	1.00	0.07
Classroom behavior	0.17	–0.02	0.97	1.01	–0.18

ference between assessments in the non-cognitive scales equals 0.5 of a standard deviation or more.

Table 5 demonstrates how students' performance correlates with whether or not their mothers have a college degree.

The effect of parental education is small yet consistent in all the domains. Although it is the smallest on confidence, children of college-educated mothers are assessed on average by 1/5 of a standard deviation higher than those whose mothers have no college degree. The effect is the strongest in the cognitive scales: reading, mathematics, vocabulary, and phonological awareness. Children from well-educated families outdo their classmates by more than 1/3 of a standard deviation.

Similar patterns are observed for the number of books at home (Table 6). Possession of educational resources in the form of large home libraries has a significant positive effect on all the indicators of

cognitive and non-cognitive development, correlating the strongest with reading literacy and vocabulary.

Preschool attendance appears to have no statistically significant effect (Table 7). Perhaps this is due to the great difference in the size of the respective subsamples: about 90 percent of children attended a kindergarten during the last year before school. However, the sample of those who did not attend a preschool institution was rather large (741 students).

As we can see, primary data analysis revealed quite evident discrepancies in the levels of cognitive and non-cognitive development of children. A deeper analysis will allow for identifying student groups statistically, based on the characteristics revealed.

3.4. Student clusters

Indicators of both cognitive (scores in mathematics and reading) and non-cognitive (performance in confidence and classroom behavior) development were selected for clustering. Table 8 presents the results of correlation analysis that demonstrate the main correlations among the variables used in further analysis.

In the process of analysis, attempts were made to separate children into three, four, five, and six clusters based on combinations of the indicators of their cognitive and non-cognitive development. Each of the solutions obtained was analyzed from the viewpoint of reasonable interpretability and balanced clustering, and the four-cluster solution proved to be the optimal one. The cluster analysis results are given in Table 9.

In Table 10, the resulting clusters are broken down by children's sociodemographic characteristics as well as their phonological awareness and vocabulary.

Brief profile descriptions of the identified student groups can be provided based on the results of cluster and descriptive analyses.

Cluster 1: High levels of cognitive and non-cognitive development

Students of this group perform well in all the domains. They outrun the sample mean by almost one standard deviation in mathematics and reading, and their performance in non-cognitive development is even better in standard deviation units (confidence 1.20, classroom behavior 1.08).

Around 90 percent attended a kindergarten during the year before school. Children in this group score the highest in phonological awareness and vocabulary. The cluster also features the highest proportion of college-educated mothers (74%), and 43 percent of the families have more than 100 books at home.

Cluster 2: Average and high levels of cognitive development and a lower-than-average level of non-cognitive development

Children in this group have average and even quite good scores in reading and mathematics (0.61 and 0.53 in SD units, respectively)

Table 8. **Mutual correlations among the variables**

Indicator	Mathematics	Reading	Confidence	Classroom behavior
Mathematics	1			
Reading	0.58**	1		
Confidence	0.29**	0.30**	1	
Classroom behavior	0.25**	0.29**	0.67**	1

Table 9. **Cluster analysis results**

	Cluster			
Indicator	1 (N=1,224)	2 (N=1,666)	3 (N=1,790)	4 (N=1,535)
Mathematics	0.93	0.61	–0.42	–0.90
Reading	0.87	0.53	–0.29	–0.92
Confidence	1.20	–0.42	0.38	–0.93
Classroom behavior	1.08	–0.39	0.45	–0.96
% of the sample	20%	27%	29%	25%

Table 10. **Descriptive characteristics of the clusters**

	Cluster				Cramer criterion
Variable	1	2	3	4	
Phonological awareness*	54**	53	49	44	0.30
Vocabulary*	54	53	48	46	0.20
Gender (percentage of boys)	41%	65%	36%	62%	0.25
Mother's education (percentage of college-educated mothers)	$74\%_{2}$	$71\%_{1}$	63%	47%	0.21
Number of books at home (percentage of families with more than 100 books at home)	43%	$36\%_{3}$	$32\%_{2}$	26%	0.12
Preschool attendance (percentage of children who attended a kindergarten during the last preschool year)	$87\%_{234}$	$89\%_{134}$	$89\%_{124}$	$88\%_{123}$	0.03

* For ease of comparison, the scores in phonological awareness and vocabulary were translated from the logit scale to 100-point scales with a mean of 50 and a standard deviation of 10.
** All differences among the clusters in every domain are statistically significant except those with subindex numbers indicating the clusters which differ insignificantly from the current one.

but score lower than average in confidence and classroom behavior (−0.39 and −0.42 in SD units, respectively). They also perform fairly well in phonological awareness and demonstrate extensive passive vocabularies. The cluster features a high percentage of boys, who account for about 65 percent. The socioeconomic status of such children is rather high: more than one in every three families has a large home library, and almost 70% of the mothers have college degrees. Nearly all the children in the group attended a kindergarten before they came to school.

Cluster 3: A lower-than-average level of cognitive development and an average/high level of non-cognitive development

Non-cognitive skills are developed quite well in this group: the children communicate easily, interact confidently, and behave in accordance with the rules and standards (0.32 and 0.45 in SD units, respectively). However, their reading and mathematical literacies are often lower than the sample mean (–0.29 and –0.42 in SD units).

The cluster is represented mostly by girls (64%). Vocabulary and phonological awareness appear to be developed statistically worse than in the previous two groups. The socioeconomic status is somewhat lower, too. Meanwhile, nearly all the children in this cluster had a preschool education experience.

Cluster 4: Low levels of cognitive and non-cognitive development

The group includes children whose levels of cognitive and non-cognitive skills are almost one SD unit lower than the sample mean: –0.9 and lower in all the four indicators. Nearly 90 percent of the students attended a kindergarten. Boys account for 62 percent of the cluster. Levels of vocabulary and phonological awareness are much lower in this cluster than in the other three. The socioeconomic status is also the lowest: only 25 percent of the families have more than 100 books at home, and over 50 percent of the mothers have no college degree.

Figures 1–4 display the relative position of the clusters across the four scales used for clustering.

4. Results and discussion

This study had a few interrelated purposes and relevant implications, both for research and practice.

First, it sought to demonstrate that direct independent assessment of children's skills at school entry is possible and teachers can use the iPIPS to build an accurate evidence-based picture of every child's cognitive and non-cognitive development. The core value of the instrument is evident in that it allows the teacher to assess the child's level of development: not only does it construct individual "profiles" of children but it also explains trajectories of child development, making predictions and inviting the teacher to help children in their cognitive and non-cognitive development. Importantly, the instrument

Figure 1. **Scores in mathematics**

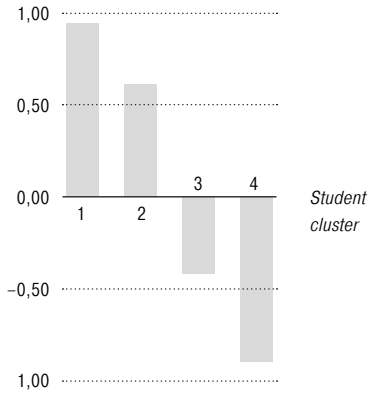


Figure 2. **Scores in reading**

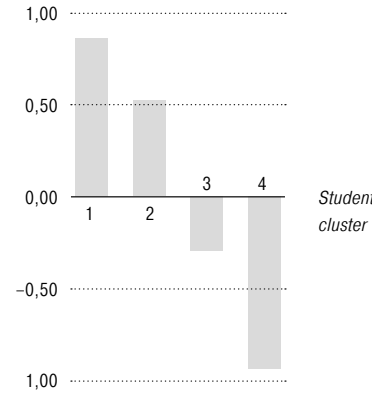


Figure 3. **Scores in confidence**

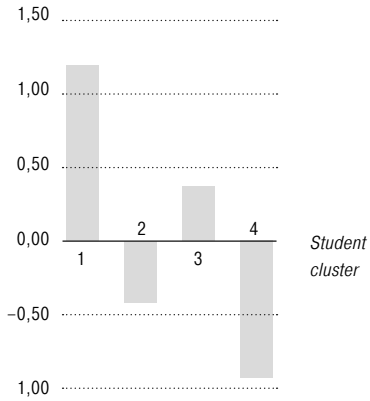
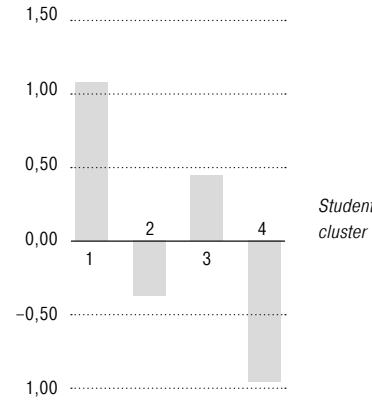


Figure 4. **Scores in classroom behavior**



allows for assessing not only the circumstances and components that are controllable by the teacher but also those beyond such control. For instance, the teacher cannot influence parental education in any way but is able to influence children's interactions with classmates and their individual cognitive needs. The teacher may change the conditions of child development, thus allowing for academic progress as well as adaptation of the child to the school and of the school, i. e. teaching strategies, to the child.

Second, the study forms the idea not only about children's development trajectories but also about the types of such trajectories, i. e. the groups (clusters) of children with similar characteristics. Such clustering, on the one hand, describes the development

of a first-grader cohort, and on the other hand it allows for identifying the common objectives in helping children with their cognitive and non-cognitive skills, thus facilitating the design of customized education programs. Cohort characteristics that will be obtained in replication studies during the coming years will make it possible to find out the differences among cohorts or generations of children enrolling to school.

The iPIPS provide teachers with multidimensional assessments of cognitive and non-cognitive development of children at school entry and at the end of the first year. These assessments can be used for evidence-based discussions on the real individual progress of every student as well as for the design of strategies to promote cognitive and non-cognitive development with allowances made for the new understanding of the child's situation represented as a personal history and trajectory of development.

The article used the findings of a large-scale survey of first-graders in four regions of the Russian Federation. Analysis revealed four groups (clusters) of first-graders that differ in the levels of cognitive and non-cognitive development and sociodemographic characteristics. The bottom scorers in both cognitive and non-cognitive skills are mostly represented by boys with non-college-educated mothers. Contrariwise, children with the highest levels of cognitive and non-cognitive development have well-educated parents, the largest home libraries, and the best scores in phonological awareness and vocabulary at the beginning of the school year. These findings confirm the results obtained by other researchers [Hindman et al. 2010].

However, the conducted study has a couple of limitations. The sample is key for generalizations. In this study, the sample consisted entirely of urban first-graders. Students from suburban or rural schools might well demonstrate different patterns of development; a separate study is required to find out the peculiar aspects of their cognitive and non-cognitive skills. Besides, although the sample in this study includes schools of different types from four cities, the sample unit is inconsistent, being either a class or a school in different cities. The total sample is thus non-representative, so the findings cannot be yet generalized for other regions or the country as a whole.

k-means clustering is used to identify the groups (clusters) of first-graders. One of the disadvantages of this method, and of cluster analysis as such, is its ultimately "statistical" nature, which means that clusters may be formed from the available quantitative data even if there is no real "theoretical" basis for classification. Stability of the resulting cluster solutions was verified using subsamples and findings from previous years in order to overcome this limitation.

Analysis is based on the results of a baseline assessment at the beginning of the school year, i. e. clusters describe children at school entry. This data is going to serve as the basis for preliminary recommendations on the best interaction strategies to be applied to children

from different groups. The recommendations for school teachers and principals are intended to be extended and improved in the future using the data on individual progress and the assistance strategies deployed by teachers.

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Humanities in School as a Tool of the Nationalities Policy:
The Case of the Republic of Tatarstan

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Abstract. The article investigates how humanities disciplines are taught in schools of the Republic of Tatarstan in terms of their role in preserving and supporting national identity. Teaching practices and curricula are analyzed to find out whether the teaching methods designed to inculcate regional identity contribute to the development of national identity as well, or whether they focus on creating an image of the region that brings it outside the context of Russia. The methods used include overt observation, in-depth interviews with school administrators and humanities teachers, and content analysis of textbooks on the history of Tatarstan. The study reveals a gap between the regional policy and real-life teaching practices. The region's education policy in teaching the humanities is aimed at achieving the objectives of the nationalities policy, which include the development of ethnic identity in students. In reality, however, teachers of the humanities focus on mitigating ethnic differences and disagreements, first of all by delivering regional history as part of the history of Russia and dismissing the role of students' ethnicity.
Keywords: education policy, national identity, humanities disciplines in school, ideology in the humanities, the Soviet Union's nationalities policy, Russia's nationalities policy, multiculturalism, korenizatsiya.

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Modern debate on the objectives of school education features a diversity of controversial viewpoints, of which two extremest distinctly stand ou. The first one can be conventionally dubbed "neutrally technocratic": the school must focus on international integration and educational outcomes measured by top international studies such as PISA and TIMSS. Advocates of the "traditionally patriotic" perspective insist on the importance of patriotic education and the need to inculcate national and ethnic identity in schoolchildren[1]. The key role in

Translated from Russian by T. Gorshunova.

[1] The attitudes presented here only capture one plane of a more intricate debate. Heterogeneity of perceptions about the objectives of school educa-

this debate is assigned to humanities disciplines, whose paramount goal is believed to consist, depending on opponent's political beliefs, either in improving the overall sociocultural development of students or in shaping national and ethnic identity. The issue of the role and significance of the humanities becomes particularly thorny where "nation" can be associated with both ethnic and national identity, which is primarily the case with the indigenous ("national") republics.

This study provides an analysis of the nationalities policy in "elite" schools of the Republic of Tatarstan, namely of the correlation between teaching practices designed to develop ethnic (regional) and national identity. The choice of "elite" schools as the object of research is based on the assumption that such schools teach children of local administrative elites, which tend to have a great influence on the development of ethnic and national identity by virtue of their intellectual and cultural status as well as by taking personal and managerial action. Due to sample specificity, the results obtained cannot be extrapolated to other indigenous ("national") republics of Russia and by no means reflect the great diversity of the local school education system, which also features, for instance, national gymnasiums that deserve a dedicated study.

With a view to identifying how the nationalities policy is implemented in schools, we first analyze the available legal documents and historical sources and then use our findings to design an empirical study, which includes textbook content analysis and processing of the data obtained in in-depth interviews and overt observations, and finally attempt to interpret this data with due regard for all the information collected. Diversity of the research methods makes it possible to pinpoint the ambivalence of the existing perceptions about the nationalities policy as well as to emphasize the fundamental inconsistencies in implementing the nationalities policy in schools. The article is structured to capture the successive stages of research.

1. The Legal and Institutional Framework of Teaching Humanities in School

In compliance with the Federal State Education Standard (FSES), which all Russian schools will have adopted by 2020, humanities serve to inculcate ethnic identity as well as a friendly and tolerant attitude towards different peoples of Russia and foreign countries.

The FSES employs the term "nation" in two meanings: (a) as an ethnic group and (b) as a politically and legally united national entity. When it comes to nation as a national entity, the case is about the "national interests" or "national values of the Russian society". Ambivalence of the term also manifests itself in the ambiguous objectives of humanities disciplines: develop "national" identity in its ethnic sense,

tion in post-Soviet Russia is analyzed, for example, in the article *Society on the Education Objectives* [Lyubarsky 2012].

on the one hand, and in its "nation state" sense, on the other hand. A separate set of objectives is associated with settling possible ethnic conflicts, i. e. teaching tolerant behavior. Thus, education policy with regard to humanities intends to preserve and reproduce ethnicities while at the same time developing national consciousness in various ethnic groups coexisting peacefully within one country.

Not only is this ambivalence typical regarding solving "national" issues in education but it also manifests itself in Russia's nationalities policy as such. This can be illustrated by one of the key documents stipulating the main goals and objectives of the government's nationalities policy, namely the Strategy for the Nationalities Policy of the Russian Federation until 2025[2], developed "in consistence with the fundamentals of the 1996 Conception of the Nationalities Policy of the Russian Federation". On the one hand, the document suggests ensuring unity (unity of peoples, integrity) of the Russian Federation as a goal and fundamental principle. On the other hand, it lays emphasis on the right of peoples for self-determination and preservation of cultural diversity, which may implicitly carry risks for national integrity. Ambivalence in defining these objectives becomes obvious in the Strategy's attempt to find grounds whereby solving one of the two problems would imply solving both:

> The Russian State was built as a unity of peoples, of which the Russian people were historically the backbone. <…> The modern-day Russian State rests on a single cultural ("civilizational") code which is based on the preservation and development of Russian culture and language as well as historical and cultural heritage of all Russia's peoples. This code is characterized by explicit commitment to truth and justice, respect for the indigenous traditions of peoples inhabiting Russia, and the ability to integrate their best achievements in the unified Russian culture.

However, the idea of a single cultural code conceals a fundamental difficulty in determining the specific nationalities policy measures rather than making the policy any clearer. If the code is shared, there should be no implicit risks associated with ethnic self-determination, yet the effects of the Soviet nationalities policy render this assumption questionable in the least. Neither does the indication of the Russian people's uniting role eliminate the fundamental difficulty, as this statement is hard to square with the ethnic equality statement. Humanities in this context are treated as a practical tool for achieving the ambivalent nationalities policy objectives. Ambivalence is tackled by functionally differentiating the curriculum: humanities disciplines of the

[2] Decree of the President of the Russian Federation No. 1666 "On the Strategy for the Nationalities Policy of the Russian Federation until 2025" of 12/19/2012. http://text.document.kremlin.ru/SESSION/PILOT/main.htm

federal component[3] aim to develop national identity, while humanities of the regional component seek to nurture and maintain ethnic identity. For this reason, one of the key indicators of achieving these objectives is "enhancing the role of humanities", along with "integrating classes dedicated to traditions and cultures of various peoples" and "using bilingualism and multilingualism to preserve ethno-cultural and linguistic diversity."

The federal grant program, Enhancing the Unity of the Russian Nation and Ethno-Cultural Development of the Peoples of Russia (2014–2020), one of the fundamental cross-sectoral programs, is another illustration of nationalities policy ambivalence[4]. The whole document is built around two main objectives: develop a common national identity and preserve the ethnic diversity of Russia[5]. Education is regarded as a nationalities policy implementation tool and as the main institution to shape identities. Meanwhile, "nation" is used here in two meanings as well, referring to both the national and ethnic identity of an individual.

Measures specified in one of the annexes to the program, whether classified as designed to develop national identity or maintain ethno-cultural diversity, most often actually seek to popularize and support local cultures. Obviously, development of "national" identity in this document is understood as popularization of specific cultures and establishment of an intercultural dialogue, or "ethno-cultural diversity management" in bureaucratic parlance. In this conception, integrity is constructed by providing conditions for a dialogue of cultures whose identities are ensured and guaranteed by the government.

One of the regional programs implementing the Strategy for the Nationalities Policy of the Russian Federation until 2025 and the federal grant program Enhancing the Unity of the Russian Nation and Ethno-Cultural Development of the Peoples of Russia (2014–2020) is called Implementation of the Nationalities Policy in the Republic of Tatarstan in 2014–2020[6]. The language and wording of the main objec-

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[3] Although the categories of "federal component" and "regional component" of curriculum prescribed by the 2004 Standard were replaced in the new FSESs by "invariant component" and "variant component", respectively, their functions in terms of nationalities policy implementation have remain commeasurable. These categories are thus used interchangeably in some contexts.

[4] Resolution of the Government of the Russian Federation No. 718 "On the Federal Grant Program 'Enhancing the Unity of the Russian Nation and Ethno-Cultural Development of the Peoples of Russia (2014–2020)'" of 08/20/2013. http://government.ru/docs/4022/

[5] For example, Annex 3 to this document mentions "enhancement of national unity and harmonization of inter-ethnic relations" and "promotion of ethno-cultural diversity of the peoples of Russia" as separate expenditure items.

[6] Resolution of the Council of Ministers No. 1006 "On Approving the State-Run Program 'Implementation of the Nationalities Policy in the Republic of Tatarstan in 2014–2010'" of 12/18/2013. http://prav.tatarstan.ru/docs/post/post1.htm?page=6&pub_id=215329

tives reproduce the discourse of the Federal Program and the Strategy. In addition to this program, there are numerous other documents on a regional level that regulate the implementation of the nationalities policy in the Republic of Tatarstan, such as state-run programs "Preserving, Studying and Developing the National Languages of the Republic of Tatarstan and Other Languages of the Republic in 2014–2020"[7] or "Preserving the Ethnic Identity of the Tatar People (2014–2016)"[8].

To summarize, the nationalities policy is legally regulated by governmental documents that are put at the heart of regional programs. Supporting ethno-cultural and national identity at the same time is seen as a key objective of the nationalities policy. However, the fundamental difficulty in achieving this objective has to do with its ambivalence, since policies designed to preserve ethnic diversity and cultures carry a certain risk of disintegration. The documents mentioned above approach education as one of the key tools of the nationalities policy, the "ambivalence" of which can be eliminated, among other things, by functionally differentiating the curriculum: humanities of one module can promote national identity, while humanities of the other, ethno-cultural or local identity. As a result, the necessity of government support for ethno-cultural and national identity is entrenched in legal documents stipulating the specific aspects of implementing the nationalities policy in Russia. To understand the historical background of this conception, genesis of the nationalities policy in the Soviet Union and post-Soviet Russia must be delved into.

2. The Development of Regional and National Identity in the Context of the Nationalities Policy in the Soviet Union and Russia

The Soviet nationalities policy was heterogeneous and varied largely throughout the history of the USSR. Still, its fundamental dominants included supporting and in some cases shaping ethnic identity (including measures designed to build ethnic groups that did not have a writing system or a high level of culture before they joined the Soviet Union), on the one hand, and constructing the identity of a Soviet citizen with international solidarity at its base, on the other hand. The international aspect of Soviet national identity, which is beyond the scope of this study, stemmed from the Marxist premise on the international nature of class solidarity ("Proletarians of all countries, unite!"), which placed the Soviet Union in a unique position among sovereign

[7] Resolution of the Council of Ministers No. 794 "On Approving the State-Run Program 'Preserving, Studying and Developing the National Languages of the Republic of Tatarstan and Other Languages in the Republic of Tatartsan in 2014–2020" of 10/25/2013'". http://tatarstan.ru/rus/file/pub/pub_204775.pdf

[8] Resolution of the Council of Ministers No. 785 "On Approving the State-Run Program of the Republic of Tatarstan 'Preserving the Ethnic Identity of the Tatar People (2014–2016)'" of 10/21/2013. http://tatmsk.tatarstan.ru/rus/file/pub/pub_203779.pdf

nation states. The Soviet Union's support for ethnic minorities put up a "showcase" designed to make the Soviet political model attractive for the Third-World countries and national liberation movements in the first place. Meanwhile, this policy relied upon the doctrinal historicist idea, shared by Joseph Stalin in particular, that before progressing to international communism, an ethnic group must first develop its local culture, in keeping with the regularities of the historical process[9] [Kurennoy 2013:14].

In the second half of the 1920s, as the idea of inevitable transition to the world revolution phase gave way to the doctrine of building socialism in a particular country, Stalin put forth a formula for hybridizing the "national" and supra-"national" aspects of Soviet identity: ethno-cultural identities should be constructed as "national in form and socialist in content" (1925) (Stalin I. (1934) O politicheskikh zadachakh Universiteta narodov Vostoka [On the Political Objectives of the University of Toilers of the East]. Marksizm i natsional'no-kolonial'ny vopros [Marxism and the Issue of Nations and Colonies], Moscow: State Political Literature Publishing House, p. 158, quoted after [Kildyushov 2012:95]). In the late Soviet period, the 24th Congress of the Communist Party defined the Soviet people as a "new historical community", "a multinational collective of urban and rural toilers, united by the all-encompassing philosophy of the socialist regime, the Marxist-Leninist ideology, the communist beaux ideals of the working class, and the principles of internationalism" [Kaltakhchyan 1976]. This way, Soviet identity had a number of aspects: ethno-cultural, Soviet—associated with identifying oneself as a citizen of the USSR,—international and class-related, and ideological, meaning commitment to a specific system of values (the Marxist-Leninist ideology). In practice, however, these aspects could rarely be harmonized, which explains the rather sharp changes in national and cultural policies, including in education. These changes can be traced by using the example of the Russian language education policy.

According to contemporary researchers, not only did the Bolsheviks contribute actively to the preservation of various ethnic cultures in the early Soviet period (between the two wars) but they also took part in constructing such ethnic cultures, in particular in shaping ethnic cultural elites. The idea of such policy was born as early as in the

[9] See, for example, Joseph Stalin's closing speech for the 10th Congress of the Russian Communist Party (Bolsheviks): "... the Ukrainian ethnicity does exist, and development of its culture is a responsibility of communists. Going against history is no good. Clearly, the Ukrainian cities that still keep elements of the Russian culture will unavoidably be Ukrainized over time" (Minutes of the 10th Congress of the Russian Communist Party (Bolsheviks), 1933, p. 216, quoted after [Kurennoy 2013:14]). For comparison: "The humanity can approach the inevitable merger of all nations through the transition period of full liberation of all oppressed nations" [Lenin 1969:256].

1920s, when the Soviet Union was laying the foundation for the korenizatsiya, mostly built around constructing and preserving ethnic cultures, with a view to winning over the political loyalty to the Soviet regime among various ethnic groups. "This policy, largely elaborated by Stalin, suggested promoting indigenous population to the key positions, creating local national systems of higher, secondary and elementary education, encouraging the development of ethnic languages, cultures and sciences in the indigenous republics and regions in order to win their support for the Soviet regime" [Dmitriev 2013:115]. The korenizatsiya involved a series of measures, including "nativization" of school and culture in remote indigenous communities. "The preference in education was given to teaching the local language and the culture of the so-called "titular" nation, while teaching of the Russian language, literature, history and culture receded into the background" [Ibid.:125].

This policy had caused some grave management issues by the second half of the 1930s. In particular, the government realized that effective military leadership was unachievable due to heteroglossia among recruits from the republics of Central Asia and the Caucasus, many of whom could not speak Russian when they arrived in military units. For this reason, and for the purpose of solving the industrialization problems, the Russian language became a mandatory subject in all schools. The pragmatics behind this initiative was managerial rather than related to ethnic culture, as the main reason for making learning Russian compulsory was the need to find ways of settling management issues in the context of increased military and industrial mobility [Ibid.: 125–130].

The Law "On Russian as a Required Class in Schools of National Republics and Regions" was adopted in 1938, the same year that Russian literature was made a compulsory course, too[10]. Before that, Russian had been an optional class, however centralized the education system was. The effects did not come immediately, which can be explained by the low quality of teaching Russian in non-Russian-speaking schools as well as by the bureaucratic reorientation difficulties [Blitsteyn 2011:310]: the implementers found it hard to realize the pragmatic and managerial objectives concealed behind the official narrative. On top of that, institutional inertness of the preceding korenizatsiya was still affecting the situation. Teaching in the native language was not forced out by making Russian a required class. A period of elaboration and approvals was followed by adopting a curriculum for native-speaking schools where the number of hours allocated to

[10] Resolution of the Council of People's Commissars of the Soviet Union and the Central Committee of the Communist Party of the Soviet Union (Bolsheviks) No. 324 "On Russian as a Required Class in Schools of National Republics and Regions" of 03/13/1938. http://lawru.info/dok/1938/03/13/n1195090.htm

Russian did not increase in the 1938/39 academic year as compared to the preceding year and even shrank at the expense of adding hours for teaching native languages [Ibid.:314].

The Soviet regime, guided by the logic of managerial decisions, was not alone in generating the need for learning Russian. Indigenous republics themselves also began to translate this need in the post-war period, reflecting the increased demand for educational mobility of youth. Some of the regions, including the Tatar ASSR, in the second half of the 1940s came up with the proposal to increase the number of hours for teaching Russian in native-speaking schools and synchronize lessons of Russian between Russian- and native-speaking schools. The motivation behind this request is clear: graduates of native-speaking schools had no opportunity to enter a Russian-speaking institution of higher education. However, no immediate approval followed, in particular because other Soviet republics refused to support the proposal. Nevertheless, in 1949 the Central Committee began to satisfy requests of individual republics and regions asking to add hours for teaching Russian. This resulted in building the model of a "national" school in 1958, where teaching in Russian prevailed, and native parents were entitled to send their children to Russian-speaking schools [Ibid.:328]. The need to learn Russian was ideologically legitimated in the early 1970s, when Russian began to be treated as the language of the "Soviet people, a new historical community". Researchers also describe the Soviet education policy of that time as a special version of the policy of multiculturalism actualized in the centralized education system [Malakhov 2007:48–49; Zajda 2006:15–17]. Unified textbooks, curricula, and teaching methods were used all over the country, but subjects designed to teach the languages, cultures and literature of the Soviet peoples varied from region to region.

During the post-Soviet period, in particular under the President, Boris Yeltsin, the formula "take as much sovereignty as you can swallow" was coupled with the focus on "Russian people" as the new Russian civic nation. In the 2000s, the ambivalent nature of the nationalities policy was documented on the level of curricula[11], which were structured to include three components—federal, ethnic/regional, and school—pursuant to the 2004 Standard. The federal component served to ensure the integrity of the educational environment; the ethnic/regional component was aimed at supporting and preserving ethnic and regional cultures (knowledge of native language, literature, history and geography); and the school component allowed for

[11] The curriculum adopted in 1993 and revised in 1995 consisted of two components, invariant and variant. The variant part was designed by schools in collaboration with the local government. That is why it is acceptable to talk about curriculum continuity in terms of the national issue, despite the change in categorization [Zajda 2006:95–96].

individualization of education [Zajda 2006:97–98]. The new FSESs[12] divide curricula into the invariant and variant components. Yet, the structural change does not imply getting rid of regional specificity. A comparison between curricula designed in compliance with the 2014 Standard and the new FSESs reveals no grounds for seeing a distinct tendency toward "unification", at least in terms of regional and national identity inculcation practices. However, the transition to the new FSESs has intensified the discrepancies between Russian- and native-speaking schools: whereas Russian-speaking schools are reducing the proportion of classes designed to construct and preserve ethnic and regional identity, this proportion is growing in native-speaking schools (or at least has every opportunity to grow). The reverse is true when the role of classes, charged by the FSES with the function of promoting the development of national identity, is increasing in Russian-speaking schools and diminishing in native-speaking ones.

As we can see, the preliminary analysis of the historical and legal framework of developing regional and national identities in Russian schools reveals a specific, historically-grounded governmental discourse, which not only aims to consolidate different ethnic groups but also provides a wide range of tools to nurture such consolidation. Still, the nationalities policy in education is not devoid of disagreements, and this survey seeks to explain their historical grounds. The empirical part of the study is designed to find out to what extent prestigious educational institutions of the Republic of Tatarstan inculcate ethnic identity and how the latter correlates with national identity.

3. Results of Examining the Humanities Teaching Practices in Tatarstan Schools

Overt observation, in-depth interviews with school administrators and humanities teachers, and content analysis of textbooks on the history of Tatarstan were used to examine the humanities teaching practices in the schools of Tatarstan. Nearly all the respondents mentioned the pro-Russian ideological component in such courses as literature or history. Interviews have revealed two prevailing types of attitudes toward this ideological bias. Some respondents regarded ideology as an indispensable element of the learning process charged with educational functions, while others were concerned with the associated risks, namely with how course content was dependent on the teacher's personal (including political) preferences.

Apparently, ideologization of humanities in school does provide a breeding ground for political speculation. As shown above, the ambivalence of the nationalities policy objectives in education is handled by functionally differentiating the curriculum, i. e. by dividing the humanities into disciplines responsible for the development of national iden-

[12] Federal State Education Standard of General Secondary Education No. 1897 of 12/17/2010. Ministry of Education and Science of the Russian Federation [website]. URL: http://минобрнауки.рф/документы/938

tity (invariant or federal component) and those designed to inculcate regional or ethnic identity (variant or regional component). However, the curriculum structure as such cannot ensure coherence between courses of the two components.

Content analysis of 7th and 8th grade teaching textbooks on the history of Tatarstan and Tatars was conducted for the purpose of this study. The following textbooks were analyzed: Gilyazarov I., Piskarev V. (2012) Istoriya Tatarstana: vtoraya polovina XVI—XVIII v. 7-y klass [History of Tatarstan: Late 16th-18th Centuries. 7th Grade], Kazan: Heter, and Piskarev V. (2012) Istoriya Tatarstana: XIX v. 8-y klass [History of Tatarstan: The 19th Century. 8th Grade], Kazan: Heter. The contexts of using notions like "Russia", "Russian people", "Tatarstan", "Tatars", "Russians", and "non-Russians" in the textbooks were analyzed to reveal the fundamental correlations among them that vary little depending on the historical narrative of the textbook: Russians treat non-Russians in the same manner as the privileged ruling class would treat the oppressed; Tatars are one of the most oppressed nations in terms of rights and freedoms afforded[13]; the basic mechanisms of oppression include tax increases, forced russification, and forced Christianization; uprising and rebellion are the main anti-oppressive practices deployed to change the imposed policies; the political and economic confrontation between the Russian and non-Russian population levels out when it comes to Russia and Russian people; religious tolerance and respect for the interests of the local population are tacitly viewed as the key prerequisites of the region's peaceful existence in the Russian context[14].

Respondents who have used the analyzed textbooks on a regular basis reported having to make additional efforts to smooth out "the bumps in the history of Tatarstan" and integrate regional history in the context of the history of Russia. Teachers most often tend to avoid using textbooks directly when teaching the history of Tatarstan. Nearly all the respondents, regardless of their ethnicity, complained about the reduced number of hours allocated to the history of Tatarstan. It has recently been recommended, they report, that they teach the history of the region as part of the course on the history of Russia without

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[13] The motif of Russian population oppressing Tatars can also be found in studies devoted to teaching the Tatar language in schools. See, for example, [Musina 2011].

[14] The role of religious tolerance is emphasized, in particular, when comparing the Russian rulers. While Peter the Great and Anna Ioannovna are depicted as hardliners maltreating the Tatar population, Catherine the Great, still referred to as *aby-patsha* ("granny-empress"), is described as a wise and sensible ruler. Catherine the Great abolished forced Christianization of non-Russians which had been practiced since Peter the Great's era and which is classified in the textbook by Gilyazarov and Piskarev as ethnic discrimination—given the fact that Christianity was mostly rejected by Tatars [pp. 71–74].

providing additional hours—or, alternatively, to include it as an isolated module of lessons at the end of the academic year. The following arguments are suggested to justify such recommendations: (a) local history may serve as an illustration for the history of the country as a whole, allowing to engage students in learning and develop both local and national identities in them; (b) there are a wide array of sources for studying local history by involving students in practical work; (c) local history may be taught via excursions and direct contact with its subjects. In general, regional history serves as a testing ground for designing and elaborating new educational technologies as evidenced in the interview data. Judging from the fact that teachers try to avoid using study guides in teaching regional history and adopt a creative approach in this course instead, there is an obvious gap between how regional history is presented in the textbooks and how it is taught in practice.

However, the logic of presenting material in textbooks on regional history is partially reproduced in alternative teaching practices. For instance, the geography of educational excursions is confined to Tatarstan and the symbolic centers of Russian culture, leaving out the neighboring regions. The textbook narrative also touches little upon the history of relations between the region and its neighboring territories; of all the regions of Russia, the textbooks only describe the interaction with Moscow as the remote "center" whose reforms affect the interests of Tatarstan directly. Not only geographic but also ethnic factors are important in constructing the narrative of the textbooks analyzed. In other words, the history represented in these textbooks is the history of Tatars inhabiting a specific region. They do not give any details on the specific characteristics of other peoples in the region (other than Tatars and Russians) or their cultures and provide no information on the culture of Tatars living outside the region.

The mention of other peoples in the textbooks is restricted to enumerations that serve first of all to represent Tatarstan as a multinational region. Besides, such enumerations can also be found in the following contexts: (a) description of the ethnic composition of separate social groups, often with an indication of economic differences among peoples as well as differences in the rights and freedoms afforded to them; (b) description of the ethnic composition of rebel groups opposing the policies of Moscow; (c) description of the economic and religious oppression of non-Russian peoples by the Russian government. Therefore, Tatarstan is represented as a multinational region whose peoples unite every time the "national" Russian state attempts to homogenize its population, as it was with the accession of the Khanate of Kazan. At the same time, recognition of the regional population's right to religious and ethnic self-determination contributes to the establishment of Russia as a multicultural country.

Taking into account the focus on ethnic conflicts between Russians and Tatars in the textbooks on regional history, interviewers

asked school administrators and humanities teachers about possible ethnic conflicts in Tatarstan today. Nearly all the respondents maintained that they had never observed any ethnic tension in their schools, which they thought could be explained by the great number of mixed marriages and the fact that some of the surveyed schools avoided emphasizing ethnic differences among schoolchildren. In fact, such schools even try to smooth out these differences by encouraging their students to solve problems of essentially different kinds, in particular to show good academic performance.

> INTERVIEWER: Don't children have problems with their identity when they have to perceive both Russian and Tatar literature as their own?
> RESPONDENT: Well, you see... this is never discussed...
> I.: You mean you don't develop any methodology to mitigate the problem?
> R.: We just never focus on it. Deliberately. We say that we have two official languages, and this is typical of many countries... This problem should be hollowed out, I mean we should deliver this way of learning languages and cultures as normal... Once you've put emphasis, the child's mind will go like, "there's something fishy about it"...

Overt observations have confirmed the respondents' belief that there are no ethnic conflicts in schools in Tatarstan today. No effects of ethnic differences on communication among students were spotted in any of the schools surveyed: students behaved and took seats in the classroom, in the canteen, and in the hallways with no signs of ethnic division. It is rather in accounting practices than in everyday school life that teachers and students are discriminated against because of their ethnicity. The classification principle adopted in school accounting systems stigmatizes the school community as carriers of ethnicity as their specific trait. For example, as judged from the accounting reports provided by one of the schools, the school is supposed to collect data on the ethnic composition of classes, thus forcing students to "choose" their identity when answering to a questionnaire item. Many of them get confused and check both options.

> R.: You know, we live here cheek by jowl with Tatars, there are so many mixed marriages... So, we have three options in social passports: "Russians", "Tatars", and "other nationalities". We demonstrate the forms and hand them out to students. And some children don't know who they are. They check both "Russians" and "Tatars". But we need to make calculations somehow... And so, we are having troubles... because we want figures to match.

Another example of formal ethnic division is how Tatar language learners are referred to: students are divided into the "Russian" and "Tatar" groups. Although these categories are ethnicity-based, in reality the groups are formed based on the level of language proficiency, i. e. for less and more advanced learners. It means that there is a considerable disagreement between the accounting classification designed to divide the population by their ethnicity and manifestations of ethnic differences in reality: when schools organize the educational process, they deliberately avoid emphasizing ethnic differences and focus on academic achievement goals as priorities that do not interfere with students' ethnic identity.

The realm of local programs turned out to be absolutely impervious to examination. All the documents on local programs promoting Tatar culture in schools, posted on the website of the Ministry of Education of Tatarstan, are presented exclusively in the Tatar language. An empirical survey has shown that every school has a Supervisor for National Education—which is part of local program implementation—who is responsible for the national component in education, including additional initiatives to popularize the Tatar culture. Such supervisors also present the ethnic component of education to third-party agencies and delegations. Responding to the item on the national component's role in identity development, all the respondents referred to the legal regulations and laws of the republic, according to which both Tatar and Russian language classes are required in every school in Tatarstan. At the same time, they reported that many of the students had no motivation to learn Tatar.

> R.: We have two official languages. Children often tend to feel indisposition to learning Tatar. Some are turned against learning the second official language by their parents, who say, why would you need it...
> I.: What do you do to overcome this barrier? How do you reach out to parents?
> R.: We actually don't, because it can lead to conflicts. What we do is we work with children by talking to them and explaining that they have to learn Tatar since there is a law about two official languages.

In addition to appointing Supervisors of National Education in schools, the republic also promotes "national" education by organizing municipal- and regional-level competitions and engaging schools in them. Nearly all Kazan schools, as judged from the interviews, take part in such competitions and projects. The respondents did not mention any similar initiatives aimed at popularizing Russian culture, except for a series of school events dedicated to the iconic figures of Russia's history and culture. Olympiads in the Russian language and literature are treated as extracurricular activities.

In general, elite schools in Tatarstan seek to retain as indifferent an attitude to the ethnic issue as possible: ethnic differences are not emphasized; teachers of history construct a more coherent narrative in their lessons than the existing textbooks do, representing the history of the region as part of the history of Russia; in addition to regional competitions devoted to Tatar culture, schools organize and hold events popularizing the iconic figures of Russia's culture as a whole. The objectives of education are set forth for students under the notion of academic attainment without any correlation with ethnic differences.

> I.: Doesn't such [ethnic] division make sense?
> R.: You probably need to go to a Tatar gymnasium then. Here, we are focused on other things. What makes sense for us is educational outcomes.

4. Results and General Conclusions

The goals and objectives of the Russian nationalities policy are laid out ambivalently in the key legal documents and programs on different levels, being designed to develop national identity among Russians, on the one part, and the ethno-cultural identity of individual peoples, on the other part. A number of regulatory documents regard preservation and development of ethno-cultural identity and providing the conditions for an intercultural dialogue as a foundation for developing national identity. Such an attitude is quite consistent with the multiculturalism policy, in a way continuing the nationalities policy of the early Soviet period, which implied active support for and development of ethnic cultures, beginning with the korenizatsiya period until the late 1950s. Another reason for seeing the present-day Russia's nationalities policy as a special type of multiculturalism policy is the extreme extent to which local education policies of some regions are impervious to external observation. In particular, the key documents regulating national education in the Republic of Tatarstan are only available in public sources in the Tatar language.

Schools are represented in the documents analyzed as one of the key tools of nationalities policy implementation, with humanities disciplines playing a particularly important role. Ambivalence of the nationalities policy objectives is captured in the curriculum structure, namely in the functional differentiation of its components: the 2014 Standard identifies the federal, regional, and school components in the curriculum. However, this differentiation does not guarantee content coherence among the humanities. For instance, the narrative of textbooks on the history of Tatarstan evolves by describing the region's relations with the government in Moscow. The textbooks underline the discriminatory nature of the center's policies, targeted first of all against non-Russians, which is clearly inconsistent with what textbooks on the history of Russia say.

The gap between the content of recommended textbooks on the history of Tatarstan and the teaching practices becomes obvious after comparing the results of interviews with school administrators and humanities teachers with the textbook content analysis findings. Teachers see their mission in the classroom in representing the history of the region as part of the country's history. The overall attitude toward the ethnic issue in the elite schools of Tatarstan can be described as indifferent: both teachers and administrators try to avoid emphasizing ethnic differences. However, the system in which schools have to operate is organized to engage them in solving the nationalities policy problems anyway. Consequently, the efforts schools make to smooth out ethnic differences and disagreements are limited by the factors that they cannot influence in any way. Such factors include:

- The accounting system organized to stigmatize students on the basis of their ethnicity;
- The content of textbooks on the history of Tatarstan, which is not consistent with that of textbooks on the history of Russia;
- The legislative framework that puts schools under obligation to integrate and promote Tatar language education;
- The focus of the system of municipal and regional competitions and projects, which involves students of nearly all the schools in the region, on popularizing only the culture of Tatars;
- The absence of courses on cultures of the neighboring peoples in curricula of the surveyed schools and the low level of cross-regional educational mobility.

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The Reading Literacy of Russian Fourth-Graders: Lessons from PIRLS-2016

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Abstract. Among the key concepts of the Progress in International Reading Literacy Study (PIRLS), reading comprehension processes are identified as the most operational, because they can serve as a basis for new teaching practices and new tools to assess academic achievements. The concept of reading processes, which is the focus of this article, has one more advantage: reading processes are defined in the PIRLS terms as universal and good for understanding both literary and informational texts. The PIRLS-2016 test demonstrated that the reading literacy of Russian fourth-graders was far superior to that of their peers from fifty other countries. An item-by-item comparison of Russian fourth-graders' answers to the test questions with the average PIRLS-2016 results proves that Russian primary school graduates can interpret and integrate ideas and information extracted from a text much better than they can retrieve explicitly stated information from the same text. Determining the strongest and relatively weak points in the reading comprehension processes of Russian fourth-graders' is required in order to unleash the educational resources that are not currently used and consequently to improve reading literacy at every stage of education.

Keywords: educational achievements, reading literacy, international study, fourth-graders, PIRLS-2016, reading processes of comprehension.

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1. Why Participate in International Studies?

The first reason as to why international assessments and their findings ought to be analyzed has to do with the low status of psycho-pedagogical sciences in modern Russian education, and reasons for this extending beyond poor funding. A science claiming to study universal patterns cannot be anything but global or international, otherwise

it will be afflicted with provincialism. Consequently, the best educational assessment practices should be analyzed while keeping in mind that what is the best today will go out of date tomorrow. The Progress in International Reading Literacy Study (PIRLS) is recognized by the international expert community as the best measure of reading literacy for 9–11 year olds.

Another reason is a pragmatic one dealing with our ability to apply scientific achievement to daily education practices. PIRLS is an international assessment of reading comprehension processes at the end of the fourth grade year. Every five years since 2001, PIRLS has provided the participant countries with important information allowing the key influencers in education to make informed, purposeful decisions. Such decisions may vary in scale, from the whole country to an individual class, but they definitely shape the future of reading literacy for the rising generation [Harrison 2017].

Why are reading comprehension processes recognized as the key indicator of education system effectiveness? Because the ability to comprehend and apply information extracted from a text is what largely affects both individual and national wellbeing:

- A fifteen-year-old student with a sufficiently high level of reading literacy is more likely to graduate from high school and pursue further education.
- National levels of reading literacy are better predictors of economic growth than other types of academic achievements [OECD 2016].

Why are reading comprehension processes at the end of the fourth grade essential? Because this is when children switch gradually from "learning to read" to "reading to learn" [Leontiev 1999]. In terms of Russian schooling, this means that academic achievements in middle school depend heavily on the reading comprehension processes of elementary school graduates. This is first of all true for learning ability as the most demanded and the least technologized outcome of education. Learning ability is directly relevant to reading literacy, as texts remain a powerful and universal teaching and learning tool even in the post-Gutenberg era. It makes sense therefore to scrutinize and reflect deeply on the PIRLS-2016 data that was disclosed at the end of 2017.[1]

2. Key PIRLS Definitions

The PIRLS definition of reading literacy is extremely loose:

> "Reading literacy is the ability to understand and use written language forms required by society and/or valued by the individual. Readers can construct meaning from texts in a variety of forms.

[1] http://www.centeroko.ru

> They read to learn, to participate in communities of readers in school and everyday life, and for enjoyment." [Mullis, Martin 2015].

Hardly could a definition like this be operational, for it provides no ground for deciding which parameters of the learning environment are crucial for such a valuable outcome. In fact, this definition embraces both aspects of written language competencies: the ability to understand texts and the ability to express one's own thoughts and feelings in writing. However, PIRLS only measures the ability to understand texts.

Reading comprehension processes have the most operationalized definitions in the PIRLS assessment. Four broad processes of comprehension are identified in the theoretical framework:

- Focus on and retrieve explicitly stated information;
- Make straightforward inferences;
- Interpret and integrate ideas and information; and
- Evaluate and critique content and textual elements.

These four reading competencies serve as the basis for the development of items accompanying every reading passage. Each of the competencies will be dwelled on below and supported by samples from the opened version of the PIRLS-2016 database[2].

While analyzing the assessment materials and findings, it is vital to bear in mind that the borders between the reading processes are rather arbitrary. All of them come into play when reading a text, and solving any reading task requires a comprehensive effort from the reader. Retrieving explicitly stated information only seems easier than interpreting and integrating ideas and information. Besides, texts with inherently different levels of difficulty and extents to which they deploy different reading processes impose unequal requirements on the reader.

The PIRLS-2016 assessment consists of 12 reading passages (six literary and six informational) and 175 accompanying questions (items). The texts and items are developed by the joint efforts of experts from every participating country, and the international expert community makes uneasy decisions on which reading process manifests itself the most in answering every particular question.

2.1. Focus on and Retrieve Explicitly Stated Information

Readers vary the attention they give to abundant explicitly stated information in the text. Some of the text's ideas may elicit particular focus and others may not. For example, readers may focus on ideas that confirm or contradict predictions they have made about the text's

[2] All publicly available PIRLS reading passages can be found at http://www.centeroko.ru.

meaning. In addition, readers often need to retrieve information explicitly stated in the text to answer a question they bring to the reading task, shoving everything else aside. Some readers check their developing understanding of the text's meaning or some of its aspects; others do not. Readers also may focus on the text at the word or sentence level to construct meanings, while others will draw on larger blocks of information [Mullis, Martin, 2015].

Every information retrieval strategy has its pros and cons, but every one of them should enable the reader to recognize the answer to the question they bring to the reading task immediately and accurately, almost automatically. Such valuable information may be contained in one or more parts of a reading passage.

The peculiarity of items asking the reader to retrieve explicitly stated information can be illustrated using the example from the passage *Sharks*. The purpose of this text is to provide the reader with diverse information on different types of sharks, their ways of living and their extraordinary sensory organs.

ITEM:
According to the article, what are *three* kinds of animals sharks eat?

What the reader needs to correctly answer this question:

1. The reader needs to scan through the whole reading passage: sharks' eating habits are mentioned a number of times in different parts of the text. However, the information in the second paragraph on the first page is already enough to give at least three examples of sharks' food:

   Some sweep up tiny floating animals and plants with their huge mouths. Some are fast swimmers that catch fish with their sharp, pointed teeth. Others search the coastline for seals, dolphins and seabirds. Many are bottom-dwellers that feed on crabs and shellfish in the ocean.

2. The reader must understand that vague and inaccurate answers are insufficient in general and in particular, in this case. For instance, the answer "Sharks eat animals" to the question "What animals do sharks eat?" cannot be accepted as correct. The answer "Sharks eat lions" is incorrect due to its inaccuracy: the reading passage says, on the last page, that great whites eat sea lions.
3. The text says that even tins of paint and license plates have been occasionally found in stomachs of tiger sharks. However, the reader must understand that these objects should not be named among animals that sharks feed on, even as a joke.
4. Readers must realize that they are not asked about common everyday perceptions, but about what the reading passage Sharks

says. So, the answer "Sharks eat people" will not be accepted because the texts says the opposite: "Sharks reject foods outside their usual diet (e. g. people) after first taking them in their mouth."

5. The reader must develop the habit of reading carefully not only the fragment containing the answer but the question itself, too. In cases where the reader is not used to getting the full and accurate idea of details, they may simply "overlook" the request to give three examples.

It might seem like trifles, but these trifles manifest the ability to find not only answers to test questions but also information to solve one's own problems. Approximate and inaccurate understanding, once evolved into a habit, may become a grave handicap for reading literacy. Skimming and scanning to get the overall idea are not the only reading strategies that nurture reading literacy. Reading slowly and attentively to get as full and comprehensive an idea of the author's "picture of the world" as possible instead of grasping the details that make sense "here and now" is equally indispensable for raising competent readers.

The item described above is of moderate difficulty. Correct answers were provided by 79.8 percent of fourth-graders, as compared to the international average[3] of 67 percent. Meanwhile, 19.8 percent of Russian fourth-graders gave wrong answers, and 0.5 percent gave no answer at all[4], which means that one in five students has not developed even the medium-level capacity to retrieve simple information lying on the surface. Such weakness in a basic reading process can cause difficulties in middle school, where the volume and complexity of text information grow like an avalanche.

The difficulty of questions, which readers answer by focusing on and retrieving explicitly stated information, is determined first of all by the following:

(1) The extent to which the information in the text is (un)familiar;
(2) The size of the fragment that should be recalled or read over to find the answer;
(3) The availability or lack of specific instructions as to which part of the text contains the answer;
(4) The extent to which the item and the answer have identical formulations (the need to make synonymous substitutions increases difficulty); and

[3] From this point on, data is provided for the 50 countries that took part in PIRLS-2016.

[4] The following data was used in analysis: (i) the percentage (%) of students who gave correct answers (full or partial); (ii) the percentage of students who gave incorrect answers; and (iii) the percentage of students who omitted the item.

(5) The reader's habit of looking for confirmation (proof) of their answer in the text.

The lack of a habit of getting back to the text every time some specific information is requested results in two typical problems for inexperienced readers. First, they discriminate poorly between the information communicated in the text and knowledge obtained from personal experience. Second, they are confined to only a rough and inaccurate understanding of any text.

2.2. Make Straightforward Inferences

Any text has "gaps" that skilled readers fill automatically, linking together pieces of explicitly stated information. Restoration of such links, almost obvious but not explicitly stated, is necessary to build a comprehensive understanding of the text. For example, a reader reading about a character's behavior can make an inference about his/her personality. By linking separate units of information with the help of straightforward inferences, readers focus not only on word- or sentence-level meaning but also on the relationship between local meanings and the global meaning of the whole text [Mullis, Martin, 2015].

Reading tasks implying that readers make straightforward inferences based on explicitly stated information have the following characteristics:

(1) The location of the small text fragment containing the answer is indicated directly or indirectly in the item itself;
(2) The answer suggests combining two units of explicitly stated information. It is important that one such unit follows the other in the text;
(3) The logical relationship between these units of information is not verbalized but follows naturally from the context;
(4) Establishing this logical relationship is within the powers of elementary school students both in terms of cognitive difficulty (simplicity) and content: children are asked to make a straightforward inference based on two pieces of information that they know from their own experience.

What has been said above can be illustrated with an item accompanying the reading passage *Flowers on the Roof*. The purpose of this literary text is to let the reader live the experience of living through the development and strengthening of friendly relations and mutual understanding between the narrator boy and an elderly rural woman who has just moved to the city and feels she has been robbed of her familiar life.

ITEM: Find the part of the story by this picture of Granny Gunn. Why did Granny Gunn wink and grin at the little boy?

The inference that the reader should make to answer the question is typical for a reading activity of any level and purpose: the reader is supposed to comprehend the small understatements in the text. In this example, the understatement is located precisely, marked with a picture of Granny Gunn in the margin:

> "Are you upset because all your animals are so far away?" I asked her.
> "I do rather miss them," she sighed.
> "Then why don't you go and fetch them?" I asked.
> Granny Gunn winked at me and gave me a funny grin.
> There was no one at home when I came to visit her the next day. Granny Gunn had taken the bus out into the country.
> That night I woke up to hear a strange cackling sound coming up the stairs. What could it be? Of course! The hens! They must have been too frightened to go in the lift!

The fragment cited above makes it clear that the old woman winked at the boy exactly because his question had given her a good idea that she would bring to life right away. Moreover, the boy made sense of her mimic message and was not surprised to hear cackling in the stairs of their block of flats.

The item implies giving a short written answer. Acceptable responses demonstrate understanding that Granny Gunn winked at the boy because she liked his idea, which she turned into a good plan. For example,

> Because the child gave her a good idea.
> She was thinking yes, I will do that.
> She decided to go get her hens.

This item represents a high level of difficulty, yet not the highest. In Russia, 76.1 percent of fourth-graders gave correct answers, as compared to the international average of 64 percent.

Only 1.3 percent of fourth-graders did not write anything at all, but 22.6 percent responded unacceptably. Why is this?

It is hard to assume that winking and grinning in response to an expressed thought is beyond children's everyday experience. However, understanding of the meaning of these common mimic signs in the context of Flowers on the Roof requires linking what immediately precedes the winking and what immediately follows it: the boy's question, the wink (and Granny Gunn's unverbalized idea), and Granny Gunn's action that this unverbalized idea is put into. Otherwise speaking, the characters' preceding and following actions should be used to reconstruct the meaning of the mimic message, and translate it into words. This task is challenging for a reader of any age, as body language is normally "read" directly, without verbal mediation.

The difficulty of questions, which readers answer by making straightforward inferences based on information explicitly stated in the text, is determined first of all by the following:

(1) The reader's habit of linking together separate pieces of information as well as filling the "gaps" and understanding the understatements that cannot but be present in any text, or the lack of such habit;
(2) The size of the "gap", or logical discontinuity, between the two units of information that the reader is supposed to link independently (in the example above, the gap was rather small; wider gaps can make the task of understanding the text unsolvable for a inexperienced reader);
(3) The reader's ability not only to understand other people's thoughts expressed in written form but also to express one's own thoughts in understandable form in writing; and
(4) The reader's ability to focus on and retrieve explicitly stated information. Obviously, insufficient development of this basic skill makes it difficult for readers to make a straightforward inference from the information contained in the text, simply because they may overlook it. As a consequence, all problems related to information retrieval (see above) also encumber readers' efforts in filling independently the small "gaps" that they inexorably come across in any text.

2.3. Interpret and Integrate Ideas and Information

As readers interpret and integrate, they are attempting to construct a more specific or more complete understanding of the text by integrating personal knowledge and experience with meaning that resides within the text. For example, readers may draw on their experience to infer the underlying motive of a character whose actions are described by the author. Because of this, meaning that is constructed through interpreting and integrating ideas and information is likely to vary significantly among readers, depending upon the experiences and knowledge they bring to the reading task [Mullis, Martin, 2015].

Let us illustrate this with an item accompanying the reading passage Leonardo da Vinci. This text introduces the reader to Leonardo da Vinci as an inventor.

ITEM: Why did Leonardo da Vinci not see most of his inventions being used?
A. He was busy inventing lots of new things.
B. He was a painter as well as an inventor.
C. He died before they were built.
D. He did not allow anyone to build them.

The text describes Leonardo's numerous invention projects but says nothing about his engineering attempts to bring any of his own ideas

to life. The reader may know something or may have no idea that da Vinci was also extremely good at military engineering, civil engineering, and land reclamation.

The choice C is considered correct, if only because the passage contains no clue to plausibility of other options (even though they are not impossible, according to common sense). The reader is expected to be self-disciplined and avoid indulging in fantasies on the artist aspiring to create more and more masterpieces and forgetting to implement the existing ones. Experienced readers are used to drawing on the author's text, looking through possible explanations of the facts stated by the author. Indeed, hints indicating that Leonardo died before any of his ideas was brought to life are scattered around the text:

> Leonardo took all the things that he learned and the ideas that he borrowed from other people and improved them. As a result, most of the drawings in his notebooks looked like totally new ideas. Some of the drawings looked like a vision of a future world—the world we know today. For example, his design for a "flying machine" was done long before any planes or hot-air balloons could be seen in the sky.
>
> Although he was so full of new ideas, Leonardo did not actually build many of the inventions shown in his drawings. One of his notebooks includes a drawing of a person with a parachute. This idea wasn't tested until nearly 300 years later, in 1783, when a Frenchman became the first person to float to earth with a parachute.
>
> Leonardo took all the things that he learned and the ideas that he borrowed from other people and improved item. As a result, most of the drawings in his notebooks looked like totally new ideas. Some of the drawings looked like a vision of a future world—the world we know today. For example, his design for a "flying mashine" was done long before any planes or hot-air balloons could be seen in the sky.

This item belongs to the highest level of difficulty. Seventy-six percent of Russian fourth-graders succeeded in making the generalization necessary to choose the right answer, as compared to the international average of 49 percent.

The difficulty of questions, which readers answer by interpreting and integrating ideas and information, is determined first of all by the following:

(1) The reader's mindset in order to understand the text completely and monitor the completeness and accurateness of their understanding constantly;
(2) The cognitive difficulty of the mental processes required to integrate and interpret messages communicated in the text;

(3) The emotional and personal depth of the narrative that the reader is about to experience aesthetically; and
(4) The reader's ability to focus on and retrieve explicitly stated information from the text and make straightforward inferences based on such information. Clearly, readers with these skills poorly developed will find it hard to interpret and integrate the text's information simply because they cannot retrieve it and/or subject it to simple mental processing. Consequently, all challenges related to information retrieval and primary-stage mental processing (see above) also decrease the reader's ability to gain an in-depth understanding of a text.

2.4. Evaluate and Critique Content and Textual Elements

As readers evaluate the content and elements of a text, the focus shifts from constructing a comprehensive, detailed and profound meaning to critically considering the text itself. Readers engaged in this process step back from a text in order to evaluate and critique it from a personal perspective or with an objective view. This process may require readers to weigh their understanding of the text against their understanding of the world—either rejecting, accepting, or remaining neutral to the text's representation. For example, readers may counter or confirm claims made in the text or make comparisons with ideas and information found in other sources.

In evaluating and critiquing elements of text structure and language, readers draw upon their knowledge of general or genre-specific features of language usage, verbal and nonverbal ways of presenting messages about ideas, feelings, and information.

Readers may reflect on the author's choice of devices for conveying meaning and judge their adequacy. Relying on their understanding of language conventions, readers may recognize advantages and disadvantages of the author's style. Further, readers may evaluate the mode used to impart information, which includes pictures, tables, charts, diagrams, etc.

In evaluating the content and organization of a text, readers draw essentially upon their past reading experience and familiarity with the expressive means of a language. This ability allows readers to judge the completeness, coherence, and clarity of presenting information or events in the text, their credibility, and the power and methods of the author's impact on the reader [Mullis, Martin, 2015].

Let us illustrate what has been said with an example of an item accompanying the text Shiny Straw. The purpose of this reading passage is to enable the reader to compare two characters through a literary experience. The reader has to recognize dramatic human problems behind the convincing characters of two wolves, who are the main characters in this story[5]. One of them, called Blue Wolf, embodies a

[5] A chapter from Daniel Pennac's *The Eye of a Wolf*.

serious and responsible attitude towards life. His sister Shiny Straw is a glorious creature, endowed with many talents, and utterly frivolous. Blue Wolf pays his own freedom as the price of trying to save his sister after a risky escapade.

> ITEM #14. Do you think that Blue Wolf would have been a better title than Shiny Straw?
> Check your choice.
> ☐ Yes ☐ No
> What in the story makes you think so?

The question about the story's name is essentially a question about understanding the fundamental meaning and message of the story. Profound understanding of the story's most important message always rests on two conditions: understanding the author's intention and the reader's attitude towards the story's events, characters, and moral collisions.

There is no one correct answer in response to this item. Or, rather, both versions are acceptable (Shiny Straw is a better name, or Shiny Straw is not a better name) as long as the argumentation demonstrates understanding of the role of Blue Wolf or Shiny Straw in the story from both the author's view and that of the reader.

This is not about giving an ingenious answer, "I like Blue Wolf / Shiny Straw more," but about speculating on what makes these characters central in the story for the reader as well as for the author. These are examples of children's answers that demonstrate both understanding the author's perspective and having their own:

> — No, because the story is about how curiosity can kill, and this is about Shiny Straw.
> — Yes, because the rescue of Shiny Straw by Blue Wolf is the central event in the story.

Each of the answers cited above points at one of the author's crucial emphases in the story while at the same time revealing the reader's interpretation of the story's fundamental meaning. Readers are not expected to discriminate between the author's point of view and their own here.

This item lies within the highest level of difficulty. Fifty percent of Russian fourth-graders were able to indicate both the author's perspective and that of their own, as compared to the international average of 38 percent.

What makes it so difficult? Just like any item implying that readers evaluate and critique content and textual elements, the item about a better name for the story does the following:

- Implies holistic reading comprehension where central and peripheral messages are brought into correlation;
- Requires constantly drawing on the text, not its individual fragments but all of its elements, both content and organization. In this case, the reader needs to be sensitive to the author's emphases that are mostly expressed compositionally;
- Requires having a considerable experience of proving one's point on the meaning of a literary work in writing; and
- Gives the reader more freedom than items of any other difficulty category, as both "Yes" and "No" answers are equally possible. However, freedom may be a challenge unless it is supported with considerable experience of rhetoric and argumentation in the classroom. It is in such situations that individual opinions are valued and thoughts need to be expressed in a way to be understandable and convincing for the readers or audience.

The difficulty of questions, which readers answer by evaluating and critiquing content and textual elements, is determined first of all by the following:

(1) The reader's habit of correlating the author's statement with their own opinion;
(2) The reader's ability to discriminate between the author's point and one's own views as well as use the text to prove that the author meant exactly what the reader engages in a dialogue with;
(3) The reader's attention to formal textual elements and habit of attending to every detail of the form as an essential sense-making unit;
(4) The reader's knowledge of sense-making formal textual elements in both literary and informational texts;
(5) Emotional and cognitive complexity of content elements that carry the text's messages (measured as the gap between the reader's personal experience and the situation described in the text); and
(6) The reader's ability to retrieve explicitly stated information, make straightforward inferences, and interpret and integrate ideas and information. Insufficient development of these reading competencies makes it difficult for readers to feel and make sense of the relationship between the content and textual elements simply because they are unable to find their bearings in the content fully and accurately. As a consequence, all problems related to information retrieval and its primary- and secondary-stage mental processing (see above) also encumber readers' efforts in evaluating and critiquing content and textual elements.

3. Strong and Weak Sides of Russian Fourth-Graders' Reading Processes

PIRLS-2016 involved over 340,000 students from 50 countries and 11 benchmarking entities. The top ten ranked were Russia (581[6]), Singapore (576), Hong Kong (569), Ireland (567), Finland (566), Poland (565), Northern Ireland (565), Norway (559), Taiwan (559), and England (559); the bottom ten were the Emirates (450), Bahrain (446), Qatar (442), Saudi Arabia (430), Iran (428), Oman (418), Kuwait (393), Morocco (358), Egypt (330), and South Africa (320).

Russia was represented by 4,577 elementary school graduates from 206 regular schools in 42 regions[7]. It showed extremely positive results in PIRLS-2016, which undoubtedly indicate the remarkable ability of Russian elementary educators[8] to raise competent readers, at least at the first stage of reading literacy development, when children are learning to read. However, a harsh law applies to any technology, including pedagogy: self-appeasement and cessation of motion soon result in decline. But how does one identify the resources of Russian methods for reading education?

Microanalysis, proposed by Marina Kuznecova, was used to find those resources: Russian fourth-graders' results in every PIRLS item were compared to the international averages [Kuznecova 2009]. The objective difficulty of an item is determined by PIRLS international averages. Relative (Russia-specific) difficulty is determined by the difference between Russian fourth-graders' average results and the average results across all the PIRLS countries. Parts of the test where this difference is positive and particularly noticeable reveal the areas of Russian readers' best achievements and the relevant conditions of teaching reading in elementary school. Conversely, the lowest difference values outline the deficiencies which can be remedied to improve the reading literacy of Russian school students.

Differences between the Russian and international averages (Δ) were calculated for each of the 175 PIRLS-2016 items. In 38 of the items, both full and partial correct answers are accepted[9]. However, this study leaves out partial correct answers because they may yield a low Δ due to the fact that the correct answers of many Russian students were complete. The difference between the Russian and international averages for the 175 items to which full correct answers were provided varies widely, from +32.2 to –5.9[10], the arithmetic mean (μ)

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6 Integral reading literacy scores on a 1,000-point scale.

7 For the list of federal subjects that participated in PIRLS-2016, see [Ministry of Education and Science of the Russian Federation et al. 2016].

8 The word *education* is used in its broadest sense here and includes home, school, and extracurricular learning environments.

9 Maximum score is two points for 32 items and three points for six other items. Partial correct answers are assigned intermediate scores (e. g. one point out of two, two out of three). For a detailed description of qualitative and quantitative assessment of PIRLS answers, see [Martin, Mullis, Hooper 2017].

10 Positive scores show how much Russian results are above the international

Table 1. **The number of items answered with varying degrees of success in the Russian sample** (the same data is given as a percentage of the overall number of items for each reading literacy in parentheses)

Reading literacy	Difference between the Russian and international averages (Δ)				Total
	High Δ > (μ + SD)	Above average (μ + SD) > Δ > SD	Below average SD > Δ > (μ − SD)	Low Δ < (μ − SD)	
Focus on and retrieve explicitly stated information	5 (10)	14 (28)	20 (40)	11 (22)	50(100)
Make straightforward inferences	10 (19)	13 (25)	23 (43)	7 (13)	53(100)
Interpret and integrate ideas and information	11 (23)	23 (49)	8 (17)	5 (11)	47(100)
Evaluate and critique content and textual elements	2 (8)	10 (40)	8 (32)	5 (20)	25(100)
Total	28 (16)	60 (34)	59 (34)	28 (16)	175 (100)

being 13.6, and the standard deviation from the mean (SD) being 7.1. Table 1 breaks down the "difference between the Russian and international averages" by processes of reading comprehension.

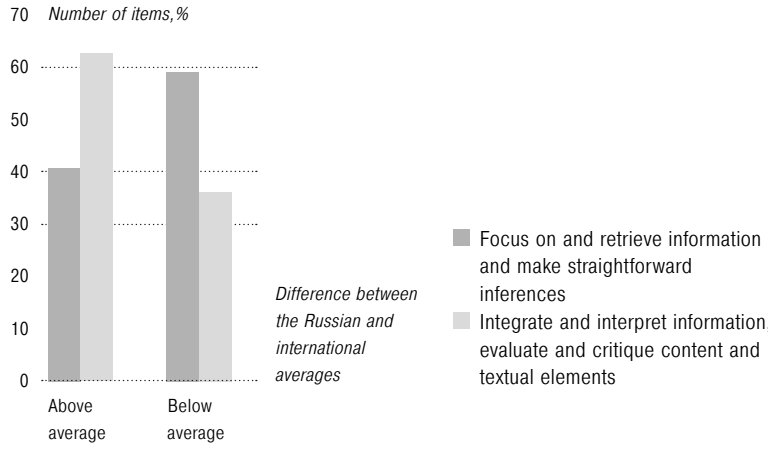
The 28 items that show a high difference between the Russian and international averages (μ + SD) describe the area of ultimate attainment of Russian fourth-graders. They mostly appeal to the reader's ability to interpret and integrate ideas and information (39 percent of the overall number of μ + SD items).

The 28 items that show a low difference between the Russian and international averages (μ – SD) outline the area of relatively weak points of Russian fourth-graders. They mostly appeal to the reader's ability to focus on and retrieve explicitly stated information (39 percent of the overall number of μ—SD items).

Figure 1 presents the same data plotted on a larger scale. First, the indicator "difference between the Russian and international averages" has only two levels here, "above average" and "below average". Second, processes of reading comprehension are merged into

average, and negative ones, how much below. The unit of measurement is the number of students who gave correct answers to the item (% of all students who have any answer).

Figure 1. **Strong and weak points of Russian fourth-graders' reading literacy** (as a percentage of the overall number of items for each category of reading competencies).



two groups, related with primary and secondary stages of information processing:

(1) ability to focus on and retrieve information and make straightforward inferences; and
(2) ability to integrate and interpret information, evaluate and critique content and textual elements.

The data in Figure 1 indicates that Russian fourth-graders are relatively stronger at the secondary stage of information processing and relatively weaker at the primary stage[11]. The same imbalance of reading competencies was observed in PIRLS-2006 [Kuznetsova 2009], but the lessons of this study have not been learned over the last decade. In other words, the foundation of the magnificent building up of Russian fourth-graders' reading literacy has long been showing signs of instability. Could this be the reason for the low reading literacy of 15-year-old Russians that has regularly been documented in the PISA assessment [OECD 2016]?

4. Conclusion

The logic of assessing reading literacy does not and should not coincide with that of developing the competencies required to under-

[11] The chi-square test shows that differences between the two categories of reading competencies are significant at the level of at least 99.9%.

stand a text. Yet, these two logics overlap in formative assessment [Pinskaya, Ulanovskaya 2013]. It is for teachers practicing formative assessment methods that this study is of particular importance, since adequately articulated questionnaire and assessment items improve educational outcomes dramatically [Wiliam et al. 2004].

Comparison of Russia's high results with the international average scores for each PIRLS-2016 item has revealed the area of relatively weak points of Russian fourth-graders: they are worse at focusing on and retrieving explicitly stated information than at interpreting and integrating ideas and information.

To come to grips with this, one should desist from seeing reading processes as a hierarchy where simpler processes form the foundation and the indispensable prerequisite for more complex ones. Rather, the relations among reading processes should be represented as concerted efforts of organs in the body. For instance, vision and digestion are equally intricate and important processes. A chick with good digestion but impaired vision will grow anemic because it can find less food than its siblings. Young readers who interpret ("digest") information brilliantly but retrieve it with negligence have few chances of growing into mature readers capable of learning through texts.

The ability to retrieve explicitly stated information and make straightforward inferences by filling the inevitable "gaps" is not a superstructure over reading speed. This fundamental reading literacy can be developed and even evaluated at stages of education as early as when a child is only able to read a couple of words. Three haiku lines can often be more effective in teaching to read each word carefully than big fat novels or textbooks. For instance, first-graders are asked to draw a picture called "The moon is flying amongst storm clouds, // Tree branches all around // Are still shedding raindrops[12]." Before taking a pencil, they peer into the verbal picture. Everyone will see the night sky, which is barely concealed by the word "moon". Many will spot openings among the clouds, marked by the word "amongst". Only few students will see, not without the teacher's prompt, the wind that carries the storm clouds: it hides behind the word "flying". Several sketches of this kind, and children begin to respond, "This is what the text says... It says that..." to the teacher's questions. This way, the seeds of reading literacy are sown timely and into a fertile ground of activities that are fun and productive. It is a lifelong way to the heights of reading literacy, full of inevitable avalanches and pitfalls where it is not enough to cite a fragment and where critical perception is expected.

Evaluating critically what has been said in this article, the reader might realize, following the authors, that individual difficulties in the development of every reading competency are not fatal. The key is to

[12] Matsuo Bashō.

overcome the lack of teaching methods that could improve the reading literacy of Russian students at all stages of school education.

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Science Education in Russian Schools as Assessed by TIMSS and PISA

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Abstract. The article investigates the specific features of science education in Russian schools as they are manifested in international assessments: the decrease in science achievements between elementary and middle school and the startling difference between the TIMSS and PISA scores of eighth- and ninth-graders. Conclusions are drawn from analysis of data obtained from the international studies (test results, participant surveys, item analysis) as well as from the characteristics of science education guidelines contained in the federal education standards and curricula. Factors affecting science performance in elementary, middle, and high school are identified. For instance, the high TIMSS scores of fourth-graders are largely explained by active acquisition of scientific knowledge beyond the school walls at this age. The sharp difference between the TIMSS and PISA results of eighth- and ninth-graders has to do, on the one part, with the close correspondence between Russian science curricula and the TIMSS conception, and on the other part with the considerable disagreement between science education in Russia and the PISA conception, since the former is little oriented toward developing scientific literacy in students. The decrease in eleventh-graders' performance in TIMSS Advanced-2015 (advanced physics) as compared to the previous cycles may be due to, among other things, the increase in the percentage of items on atomic/nuclear physics, which turned out to be the cause of more difficulties for students. The TIMSS, PISA, and TIMSS Advanced results of 2015 indicate that science education in Russian schools is aimed more at acquiring and demonstrating knowledge rather than applying it or learning the scientific procedures and practices, i. e. evaluating and designing scientific enquiry, inter-

preting data and evidence scientifically. The novelty of this study is that it brings together international assessment data on the quality of science education in Russia at all levels of school education for the first time.

Keywords: science education, international comparative studies on educational quality, PISA, TIMSS, educational attainment, scientific literacy.

DOI: 10.17323/1814-9545-2018-1-79-109

The year 2015 witnessed a coincidence of regular cycles of as many as three international studies of secondary education quality: TIMSS, PISA, and TIMSS Advanced. All three are designed, among other things, to assess school student attainment in natural sciences across countries. The TIMSS, administered in four-year cycles, measures the quality of science education among students from the fourth and eighth grades. The PISA (conducted every three years) tests the so-called scientific literacy of 15-year-olds. The TIMSS Advanced evaluates every seven years the educational attainment of students in their final year of secondary school (eleventh grade in Russia) enrolled in special advanced physics programs or tracks. Russia participates in all three assessments, so the 2015 results can be regarded as a fairly informative dimension of horizontal data on school science education.

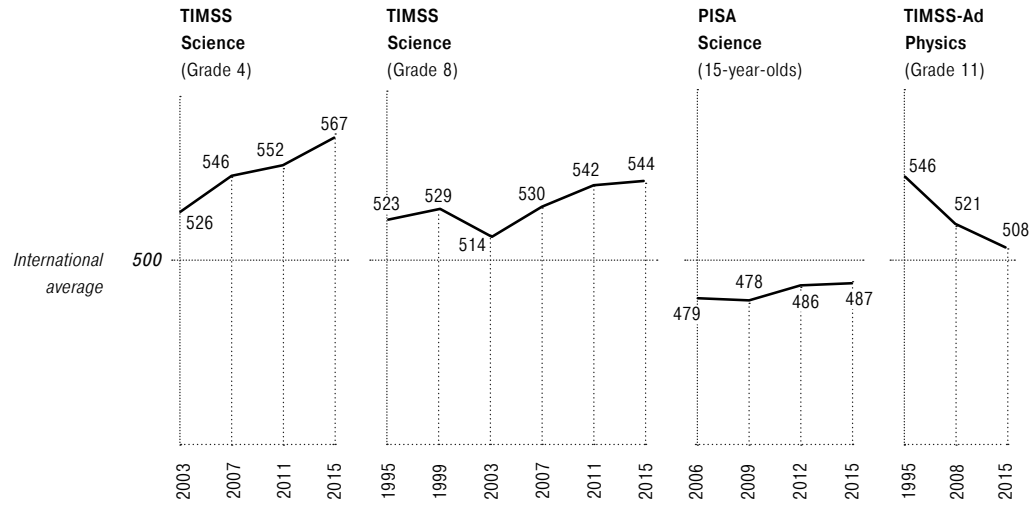
Figure 1 presents Russia's science education results in the cycles of all three studies, measured by the national sample average; the continuous line corresponds to the international average of 500 points.

The graphs present a rather controversial picture:

- Russia's results are higher than the international average in all the assessments except for PISA;
- Not only are the TIMSS results in the fourth grade high in absolute terms but they also reveal a positive trend;
- The 2015 results in the eighth grade show very little change as compared to the previous TIMSS cycle in 2011, i. e. there is no trends in this time segment;
- Fifteen-year-old students (mostly ninth-graders) performed lower than average in the PISA Science tests, and there is almost no difference between the results of 2012 and 2015. However, if we compare the 2006–2015 period, when science literacy was PISA's top priority, we will see some progress over the period (8 points);
- The eleventh grade demonstrates an essential downward trend in performance in advanced physics, yet Russia's 2015 score is still higher than the international average.

Obviously, these oppositely-directed trends need to be analyzed in depth and commented upon.

Fig. 1



The Phenomenon of Russian Elementary School

Table 1 shows the TIMSS-2015 results of fourth-graders in Science [Martin et al. 2016]. Only two countries, Singapore and South Korea, demonstratesd better performance, and Japanese students performed nearly the same as their Russian peers. The results in the other 43 countries are significantly lower than in Russia. Moreover, Russian elementary school graduates have shown continuous progress since 2003, when Russia participated in the TIMSS fourth grade for the first time (Fig. 2) [Center for Education Quality Assessment, Institute for Strategy of Education Development, Russian Academy of Education 2016b]. Russian scores have grown by 41 points on the international scale over this period. As compared to the previous study cycle (2011), Russian students scored 15 points higher in Science in 2015, which is not typical of any country. Seventeen countries improved their performance between 2011 and 2015, while 16 remained where they were, and eight showed a decrease.

Meanwhile, the high results of Russian fourth-graders in science are even more surprising than, say, the unsatisfactory results of 15-year-olds in PISA science literacy. The truth is that the TIMSS Science Framework for the fourth grade [Martin et al. 2016], designed in collaboration with all the participating countries, goes far beyond the curriculum of the "The World Around Us" (TWAS) course delivered in Russian elementary schools[1].

[1] Elementary Education Curriculum Guidelines (2015). Approved by the Resolution of the Federal Academic Association for School Education of April 8,

Table 1. **TIMSS-2015 Results in Fourth Grade Science**

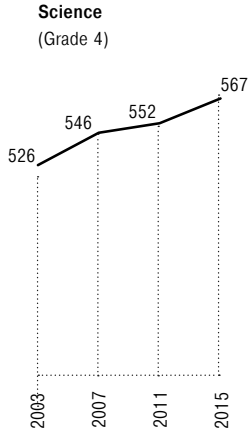
Country	Average Score
1. Singapore	590 (3.7)
2. Republic of Korea	589 (2.0)
3. Japan	569 (1.8)
4. Russian Federation	567 (3.2)
5. Hong Kong (SAR)	557 (2.9)
6. Taiwan	555 (1.8)
7. Finland	554 (2.3)
8. Kazakhstan	550 (4.4)
9. Poland	547 (2.4)
10. United States	546 (2.2)
11. Slovenia	543 (2.4)
12. Hungary	542 (3.3)
13. Sweden	540 (3.6)
14. Norway	538 (2.6)
15. England	536 (2.4)
16. Bulgaria	536 (5.9)
17. Czech Republic	534 (2.4)
18. Croatia	533 (2.1)
19. Ireland	529 (2.4)
20. Germany	528 (2.4)
21. Lithuania	528 (2.5)
22. Denmark	527 (2.1)
23. Canada	525 (2.6)
24. Serbia	525 (3.7)

Country	Average Score
25. Australia	524 (2.9)
26. Slovak Republic	520 (2.6)
27. Northern Ireland	520 (2.2)
28. Spain	518 (2.6)
29. Netherlands	517 (2.7)
30. Italy	516 (2.6)
31. Belgium (Flemish)	512 (2.3)
32. Portugal	508 (2.2)
33. New Zealand	506 (2.7)
TIMSS Scale Average	**500**
34. France	487 (2.7)
35. Turkey	483 (3.3)
36. Cyprus	481 (2.6)
37. Chili	478 (2.7)
38. Bahrein	459 (2.6)
39. Georgia	451 (3.7)
40. UAE451	(2.8)
41. Qatar	436 (4.1)
42. Oman	431 (3.1)
43. Iran	421 (4.0)
44. Indonesia	397 (4.8)
45. Saudi Arabia	390 (4.9)
46. Morocco	352 (4.7)
47. Kuwait	337 (6.2)

According to the international analytical report [Ibid.], TIMSS-2015 tests could assess knowledge in all natural sciences taught in school: life science (biology), physical science (physics and chemistry), and Earth science (geography). These content domains were represented in the TIMSS-2015 tests for the fourth grade in the following ratio: life science-45 percent, physical science-35 percent, and Earth sci-

2015. Minutes No. 1/15. Register of School Education Curriculum Guidelines. http://mosmetod.ru/files/dokumenty/primernaja-osnovnaja-obrazovatelnaja-programma-osnovogo-obshchego-obrazovanija.pdf

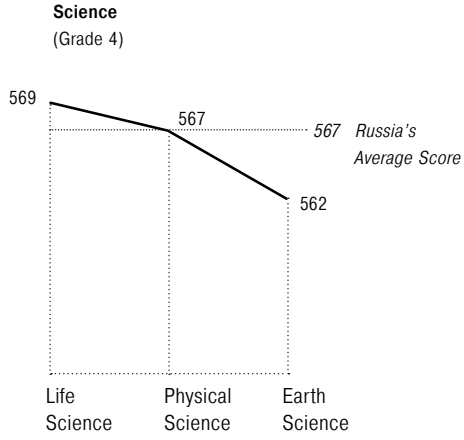
Fig. 2. **The Progress of Russian School Students in the TIMSS Fourth Grade Assessment over the Entire Period of Participation** (International Scale Average)



ence-20 percent. Russia's Elementary Education Curriculum Guidelines (2015) shows prevalence of the biology and geography components, often interrelated on the level of natural communities, which together account for about 95 percent of all the scientific content in TWAS. As little as 5–6 percent is left to physical sciences, which only give the most general idea of the diversity of matter and the properties of the three main states of matters. Meanwhile, the TIMSS-2015 tests asked fourth-graders to demonstrate the following knowledge and skills in physical science [Ibid.]:

- Compare and classify objects and materials by their physical properties (weight/mass, volume, state of matter, thermal or electrical conductivity, whether an object sinks or floats in water);
- Know the properties of metals (electrical and thermal conductivity) and relate them to metal applications;
- Give examples of mixtures and explain how they can be separated into ingredients using physical methods (screening, filtering, evaporation, or magnetism);
- Know ways of speeding up the rate of dissolving matters in a given amount of water (heating, stirring, increasing surface area) and compare concentrations of two solutions with differing amounts of solvent/solute;
- Recognize the observed transformations of substances that result in new substances with different properties (decay, burning, rusting, boiling);
- Associate familiar physical phenomena (shadows, reflection, rainbow) with the properties of light;

Fig. 3. **Russian Fourth-Graders' TIMSS-2015 Scores in Three Content Domains of Science** (International Scale Average)



- Know that vibrating objects can produce sound;
- Know that magnets have "north" and "south" poles, that like poles repel and opposite poles attract;
- Know that electrical energy in an electric circuit can be converted into other forms of energy, e. g. light and sound;
- Explain that a closed electric circuit is required for the operation of simple electrical systems, e. g. a pocket lantern;
- Know that forces (pushing or pulling action) can change the direction of motion and compare the effects of forces of different magnitudes when they are directed the same or oppositely.

This list of knowledge and skills specified in the TIMSS Physical Science Module but lacking in the Russian program is nowhere near complete. There is much more matching in biology and geography, but even here, for example, the extensive topic of "Life Cycles, Reproduction, and Heredity" is not represented in the Russian "The World Around Us" course. For the complete list of TIMSS topics lacking in the Russian science curriculum, see, for instance, [Demidova 2017].

The TIMSS-2015 results of Russian fourth-graders in three content domains of science are shown in Figure 3 [Center for Education Quality Assessment, Institute for Strategy of Education Development, Russian Academy of Education 2016b].

Russia is among those countries with the lowest allocation of science education time in elementary school. Russian pupils receive slightly under 50 hours of science education per annum in the fourth grade, as compared to 96 hours in Singapore, 92 in South Korea, and 91 in Japan. Besides, there are countries that allocate significant-

ly more time to science education for elementary pupils than Russia: 162 hours in Portugal, 161 in Chili, 135 in Qatar, 110 in Georgia [Martin et al. 2016]. However, they are not ranked among the top TIMSS performers (see Table 1).

To summarize the phenomenon, Russian pupils do not study much of what is assessed in TIMSS and what is part of the science curricula in most countries. In addition, elementary schools in Russia allocate much less time to science education than most countries. However, Russian fourth-graders are among the highest achieving students in the TIMSS ranking, which means they succeed in performing the tests of this international study.

How can this phenomenon be explained? The report [Center for Education Quality Assessment, Institute for Strategy of Education Development, Russian Academy of Education 2016b] identifies the following factors that differentiate Russian fourth-graders from their foreign peers (data was obtained from surveys of students, their parents, teachers and administrators of the participating schools):

1) Russian fourth-graders (aged 10.8 on average) are more than six months older than their peers in the other participating countries (whose average age is 10.2), with the exception of two countries, Norway and Denmark. Empirical studies have proved that fourth-graders' scores in PIRLS (reading literacy) reveal an obvious correlation with pupil age even when the difference is as small as a few months [Van Damme et al. 2010];
2) The level of education of elementary school graduates' parents in Russia is one of the highest in the world;
3) Russian parents are ranked first in the amount of time devoted to preschool home education activities;
4) Ninety-three percent of Russian fourth-graders do their homework every day, which is only second to Kazakhstan and Japan (94 percent in both);
5) Russian parents render a great deal of support to their children in learning: 72 percent of parents make sure their children do their homework on a daily basis, which is also one of the highest rates across all the participating countries;
6) Russian elementary school teachers are among the oldest ones: 81 percent of teachers are aged above 40 (as compared to the international average of 58 percent), and only 5 percent are younger than 30. An average Russian teacher has 25 years of teaching experience, and 78 percent have been teaching for more than two decades, as compared to the international average of 17 years (15 years in the top-ranking countries). Elementary school teachers in Russia are 100 percent female, while the other countries have on average 18 percent of male teachers;
7) In all the countries, pupils who like studying natural sciences demonstrate on average better performance. However, the cor-

relation is not applicable to a number of countries including Russia: 58 percent of Russian fourth-graders who liked the TWAS course scored only 4 points higher in TIMSS than the eight percent of children who did not like the class. Moreover, the proportion of Russian pupils who like natural sciences has even dropped from 62 to 58 percent since 2011;

8) Eighty percent of pupils in Russia are fully engaged in science lessons (as compared to the international average of 69 percent) and 18 percent show weak engagement (the international average is 25 percent). No difference was observed in the results between the two groups.

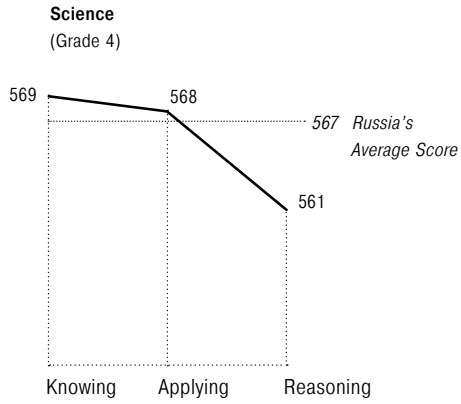
Naturally, these factors are not enough to explain the observed phenomenon of Russian fourth-graders' excellent performance in science. However, they reveal the grounds for a simple and rather obvious hypothesis: with regard to Russian fourth-graders, the TIMSS Science test measures the quality of extracurricular education rather than that of education in the classroom.

Apart from the lack of many TIMSS topics in TWAS and the small amount of time allocated to science education, the hypothesis is supported by the following:

- Russian fourth-graders are older than their peers in other countries (point 1), which means they have slightly more life and learning experiences;
- Parents devote more time to the education of their children (points 3 and 5) and have high levels of education themselves (point 2);
- There is almost no difference in the scores between children who like science lessons and those who do not (point 7) as well as between pupils who engage more and less in the learning process (point 8);
- Although the interest in science lessons has decreased since 2011, the TIMSS results have improved (see Fig. 2);
- It is hard to expect from Russian elementary school teachers, who are older than their foreign colleagues (point 6), that they will apply advanced science teaching methods to compensate for content deficiencies.

Of course, all of this raises a question, where do elementary pupils get their science knowledge from, if not from school lessons? And why could Russian pupils find themselves in a more advantageous position than students in most other countries? The answer to these questions implies in-depth analysis of the learning environment (in its broad sense) of this age group, which obviously includes family, the system of supplementary education (which is well-developed in Russia), and science fiction TV shows and cartoons. It could be that the inadequate science component of elementary school education has

Fig. 4. **Russian Fourth-Graders' Scores in TIMSS Tests Assessing Scientific Thinking in Various Cognitive Domains**
(International Scale Average)

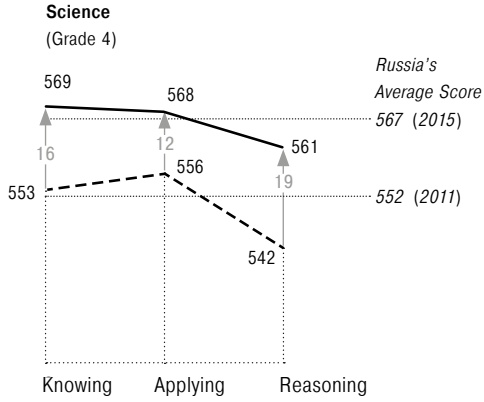


had a positive effect by making room for children's natural curiosity beyond the school walls.

The TIMSS also discriminates between tests assessing scientific thinking in different cognitive domains: reproducing factual knowledge ("knowing"), applying knowledge in real-life contexts ("applying"), and explaining phenomena or describing one's own observations ("reasoning") [Demidova 2017]. Russian fourth-graders tend to perform better in knowing and applying (Fig. 4) [Center for Education Quality Assessment, Institute for Strategy of Education Development, Russian Academy of Education 2016b], while the reverse is true for the three countries ranking above Russia (see Table 1), where pupils are more successful in reasoning. Perhaps, this effect is also a consequence of the extracurricular nature of science education in Russia. Children absorb information and knowledge from various sources easily but are less likely to learn systematically how to explain, reason, or solve problems.

Figure 5 shows the contribution of different thinking processes to the overall improvement in TIMSS results between 2011 and 2015. Reasoning appears to have improved most of all (+19 points). Development of the cognitive skills that can be listed in the "reasoning" domain—make inferences, determine relationships between objects, analyze information, and create simple models—is defined by the new standard of elementary education (Federal State Education Standard of Elementary Education), introduced in 2011, as expected educational outcomes. Such meta-subject skills could manifest themselves in science performance. However, by promoting the development of a number of qualities required for scientific reasoning, the standard does not eliminate the deficiencies in the content of science education in Russian elementary schools.

Fig. 5. **The Contribution of Different Cognitive Skills to the Improvement in TIMSS Results Between 2011 and 2015**
(Points on a 1,000-Point Scale)



Analysis of Russian fourth-graders' TIMSS-2015 scores and the changes in them provides the grounds for identifying the reforms that science education in Russian elementary schools needs in order to conform to the present-day standards of teaching science to elementary pupils. Such reforms should not be limited to expanding curricula by including new content modules. Children of this age group happily obtain most of the knowledge lacking in the curriculum beyond the school walls. Consequently, changes should just as much, or even to a greater extent, affect science teaching methods, redesigning them to maintain and encourage pupils' curiosity and natural desire to explore nature.

Why PISA and TIMSS Results Differ That Much

Another curious feature of science education in Russian schools that reveals itself in the international assessments consists in the huge gap between results in PISA (15-year-old students) and TIMSS (eighth grade). Indeed, while Russia was ranked in thirties with a below-average score in PISA 2015 [OECD 2016; Center for Education Quality Assessment, Institute for Strategy of Education Development, Russian Academy of Education 2016a], Russian students ranked seventh in TIMSS-2015 with a score high above the average [Martin et al. 2016]. A similar pattern was observed in the previous cycles of both assessments. For analysis of the differences in Russian school students' results in mathematics and science between PISA-2003 and TIMSS-2003, see [Kovaleva 2006], and between PISA-2006 and TIMSS-2007 [Polivanova 2015].

To ensure a meaningful comparison, it makes sense to examine only the countries that participated in both studies in 2015. In Table 2,

Table 2. **Science Performance in Countries that Participated in PISA-2015 and TIMSS-2015 (Grade 8)**

#	Country	PISA		TIMSS		DIFF
		Score	RANK	Score	RANK	RANK
1	Canada	528	4	526	12	8
2	New Zealand	513	7	513	15	8
3	Australia	510	9	512	16	5
4	Norway	498	12	509	17	5
5	Chili	447	21	454	25	4
6	Italy	481	16	499	19	3
7	Hong Kong (SAR)	523	5	546	6	1
8	Malta	465	20	481	21	1
9	Singapore	556	1	597	1	0
10	Japan	538	2	571	2	0
11	Taiwan	532	3	569	3	0
12	UAE	437	22	477	22	0
13	Thailand	421	24	456	24	0
14	Georgia	411	26	443	26	0
15	Jordan	409	27	426	27	0
16	Lebanon	386	28	398	28	0
17	Sweden	493	14	522	13	–1
18	Israel	467	19	507	18	–1
19	Republic of Korea	516	6	556	4	–2
20	Great Britain	509	10	537 (England)	8	–2
21	Ireland	503	11	530	9	–2
22	Qatar	418	25	457	23	–2
23	Slovenia	513	8	551	5	–3
24	United States	496	13	530	10	–3
25	Turkey	425	23	493	20	–3
26	Lithuania	475	18	519	14	–4
27	Hungary	477	17	527	11	–6
28	Russian Federation	487	15	544	7	–8

these countries are listed using the rank-ordering method suggested in [Grønmo, Olsen 2006].

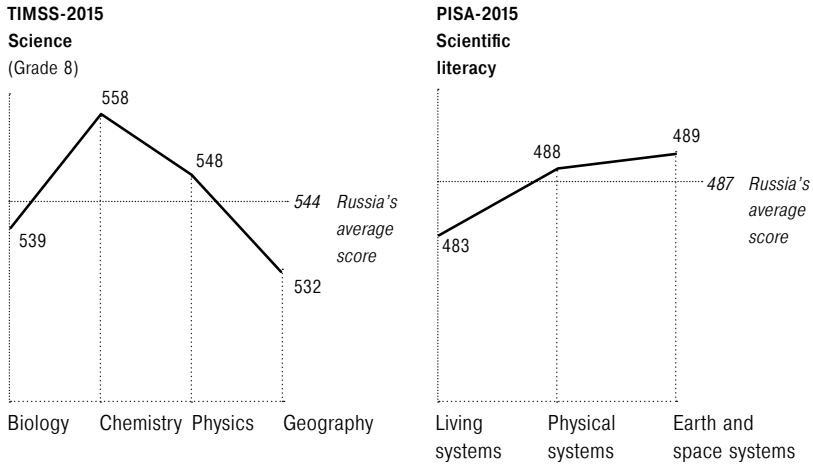
The rankings in Table 2 are determined by the relative position of these 28 countries in both studies. The countries are sorted by the decreasing difference between their ranks in PISA and TIMSS, positive numbers corresponding to higher rank in PISA.

Most countries appear to have close results in both assessments (the difference in rank being 2 at the most), the top-rankers in both PISA and TIMSS being Singapore, Japan, and Taiwan. Russia, Canada, and New Zealand show the greatest difference in ranks, but Russia scores better in TIMSS, in contrast to Canada and New Zealand.

What are the reasons for such a wide gap between Russian school students' science scores in TIMSS and PISA, and what inferences about science education in Russian schools can be made based on this difference? It is unlikely that the key lies in the age difference of 12–18 months or a sharp decline in quality of science education between the eighth and ninth grades, although these hypotheses need to be tested, too. A more plausible assumption is that TIMSS and PISA goals and, consequently, instruments are profoundly different and, crucially, that this difference has become critical in the polarization of advantages and disadvantages of Russian school science education.

The TIMSS and PISA approaches to student assessment and performance of different countries in these two assessments have been compared in a number of studies, e. g. [Olsen 2005; Grønmo, Olsen 2006; Hutchison, Schagen 2007; Tyumeneva, Valdman, Carnoy 2014; Polivanova 2015; Carnoy et al. 2016; Klieme 2016]. However, most of these, with the exception of [Olsen 2005], have been based on analyzing the mathematical competencies of students in both TIMSS and PISA. The aim of TIMSS is defined as to assess knowledge and skills acquired as a result of learning mathematics and science [Martin et al. 2016]. Otherwise speaking, TIMSS demonstrates how students assimilate mathematic and scientific material from the perspective of some international standards agreed among the participating countries. The aim of PISA with regard to science is defined in a different way: to study and measure scientific literacy of students. PISA documents (e. g. [OECD 2016; Center for Education Quality Assessment, Institute for Strategy of Education Development, Russian Academy of Education 2016a]) define scientific literacy by the three competencies to: explain phenomena scientifically; evaluate and design scientific enquiry; and interpret data and evidence scientifically. Of no less importance—this is also part of the definition—is that these competencies are needed for students to be informed critical consumers of scientific knowledge and engage in critical discussion about issues that involve science and technology [OECD 2016]. Thus, PISA is designed to assess how successfully scientific competencies are applied to real-life problems and contexts—relevant but extending beyond the school curriculum.

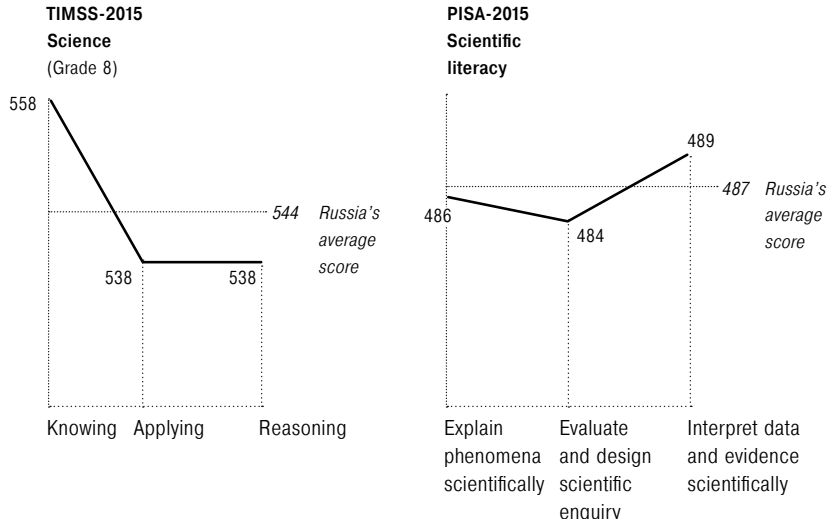
Fig. 6. **Russian Pupils' Results in Subjects and Content Domains of TIMSS-2015 and PISA-2015** (International Scale Average)



The differences in the aims of TIMSS and PISA determine the differences between their tests (instruments). In terms of content, TIMSS tests for the eighth grade are classified distinctly by the subject assessed, while PISA tests fall into three scientific fields—"living systems", "physical systems", and "earth and space systems"—that do not fit precisely into the school subjects. Yet, the fit is rather close between "life science" (TIMSS) and "living systems" (PISA), "physical science" (TIMSS) and "physical systems" (PISA), "earth science" (TIMSS) and "earth and space systems" (PISA). Russian pupils' results in subjects and content domains of both assessments are shown in Figure 6 [Center for Education Quality Assessment, Institute for Strategy of Education Development, Russian Academy of Education 2016c; Center for Education Quality Assessment, Institute for Strategy of Education Development, Russian Academy of Education 2016a].

Perhaps, the only thing that these results have in common is lower performance in biology (life science / living systems) as compared to the average scores of Russian pupils in both TIMSS and PISA. Meanwhile, performance in this domain contributes a lot to the overall test score, accounting for the best part of tests in both studies: 36 percent of the TIMSS assessment focus on life science, and 40 percent of PISA is about living systems. Today, out of the three scientific subjects (physics, chemistry, biology) only biology is studied throughout the whole period of middle school in Russia (5th-9th grades) and it receives the greatest number of teaching hours during this period, as compared to physics and chemistry. However, the effects observed are rather negative.

Fig. 7. **Russian Pupils' Science Scores in TIMSS and PISA, broken down by Cognitive Domains and Competencies**
(International Scale Average)



It is much harder to compare TIMSS and PISA by the types of competencies that they assess, as their tests are classified on essentially different bases. The TIMSS embraces the cognitive domains of "knowing" (reproducing factual knowledge and applying it in standard learning contexts), "applying" (applying knowledge in more complex contexts), and "reasoning" (explaining phenomena or describing observations and experience). The PISA, in its turn, is designed to assess three competencies: "explain phenomena scientifically", "evaluate and design scientific enquiry", and "interpret data and evidence scientifically". Figure 7 presents Russian students' results in both studies, broken down by cognitive domains and competencies [Center for Education Quality Assessment, Institute for Strategy of Education Development, Russian Academy of Education 2016c; Center for Education Quality Assessment, Institute for Strategy of Education Development, Russian Academy of Education 2016a].

TIMSS tests were analyzed in the "coordinates" of PISA-assessed competencies in order to establish the correspondence between the two studies. It was possible to conventionally classify about 45 percent of TIMSS tests under the "explain phenomena scientifically" competency (as compared to 48 percent in PISA), about 5 percent of TIMSS tests under the "evaluate and design scientific enquiry" competency (21 percent in PISA), and about 9 percent of TIMSS tests under the "interpret data and evidence scientifically" competency (31 percent in PISA). The remaining roughly 40 percent of TIMSS tests do not fit into

Table 3. **The Main Differences in Science Questions Between TIMSS and PISA**

	TIMSS	PISA
1	Normally offers a standard, formalized context	Normally offers a novel, unfamiliar real-life context
2	The amount of information that needs to be processed to answer the question is small, fitting easily into the familiar, "What is known?"	The amount of information that needs to be processed to answer the question is considerable; this information rather resembles a scientific or science fiction text than a typical school problem setting
3	Items are isolated and include one or two questions	Items are grouped into topical modules, most of which include from 3 to 5 tasks interconnected by some kind of a plot
4	Few items (5 percent) assess how students evaluate and design scientific enquiry	One fifth (21 percent) of the items assess how pupils evaluate and design scientific enquiry
5	Very few items imply analysis of data from graphs or tables; the graphs look perfect instead of being drawn using test points	A number of items involve the handling of real-life scientific data presented as graphs, tables, or diagrams
6	Very few items touch upon environmental issues	Over one third of all items touch upon environmental issues one way or another

the PISA competency-based classification at all. Most of this 40 percent is represented by the so-called reproductive tasks, when a student only needs to reproduce the relevant piece of scientific content to answer a question, e.g. assign an animal with described characteristics to one of four taxonomical groups offered or say which type of energy is possessed by a compressed spring by choosing the correct answer from the four options. For a detailed analysis of TIMSS tests, see [Kamzeeva 2017].

The inverse procedure, i.e. analysis of PISA tests in the "coordinates" of TIMSS-assessed cognitive domains, shows that nearly all PISA tests can be classified under "reasoning" (although the boundary between "reasoning" and "applying" often looks rather conventional), which has been revealed by researchers comparing the TIMSS and PISA approaches to mathematical literacy assessment [Grønmo, Olsen 2006].

Therefore, the two studies overlap in the cognitive domains and relevant competencies only partially, by roughly 60 percent if judged from the PISA's perspective. However, it is probably not this factor that determines the main difference between TIMSS and PISA test questions. Item comparison between both assessments allows for identifying a number of additional differentiating parameters (Table 3).

It would appear reasonable that all these differences together are responsible for the gap in Russian pupils' results between TIMSS and PISA. To put it another way, it is the specified characteristics of PISA items that explain difficulties experienced by Russian school students. One may suggest a number of reasons behind such difficulties, like the insufficient level of teacher knowledge. However, Martin Carnoy and his colleagues [Carnoy et al. 2016] have proved that the level of teacher knowledge has an insignificant effect even on the TIMSS scores of Russian pupils in mathematics, although the content of TIMSS tests is quite in line with the Russian standards here. As for PISA, the authors believe that a number of competencies (understand and interpret texts, model real-life contexts mathematically) required to solve PISA items in mathematics have never been taught in Russian schools. It means that PISA results cannot be regarded as an indicator of Russian teachers' knowledge, as developing those competencies has never actually been part of their education or experience.

Probably, neither is teacher knowledge a decisive factor in pupils' TIMSS and PISA scientific achievements. In recent years, a series of studies have sought ways of increasing teacher influence on the academic performance of students, in particular they have discussed possible domains of teacher training to improve the development of scientific literacy among students [Pentin 2012]. A number of factors potentially affecting PISA performance have been identified, teaching methods being one of the most important of these [Kovaleva, Loginova 2017]. Student-centered teaching practices can be more useful for PISA results than the teacher-centered approach. However, Russian schools have been using passive learning methods much more extensively so far. In addition, Russian science education curricula, textbooks, and assessment instruments have the characteristics typical of TIMSS items (left column of Table 3), attending little to the tasks and material presenting methods applied in PISA (right column of Table 3).

The peculiar features of PISA items are not important so much per se; rather, they act as concrete indicators of science education orientation toward the development of scientific literacy. At the same time, the perceptions of the aims and expected outcomes of TIMSS and PISA do not have to be opposed to each other. The performance of such countries as Singapore, Japan, and Taiwan demonstrates the possibility of being equally successful in both (conventionally) applied and pure mathematics, assessed by PISA and TIMSS, respectively. Having analyzed the test results of pupils from Singapore, Japan, and Taiwan—outstanding in both assessments—Liv S. Grønmo and Rolf V. Olsen come to a conclusion that "mathematics in school in the East Asian countries to a great extent focus on pure mathematics in all topics, while at the same time they also give some attention to the full cycle of applied mathematics" [Grønmo, Olsen 2006]. And further: "Our analysis and comparisons between TIMSS and PISA support that in order to do well in daily life mathematics, students need a

basis of knowledge and skills in pure mathematics. <…> This indicates that it is important in school curriculum that mathematical literacy is not seen as an alternative to pure mathematics. A reasonably high level of competence in pure mathematics seems to be necessary for any type of applied mathematics. On the other hand, if too little attention is given to the full cycle of applied mathematics, it is unlikely that students will develop the type of competence we may call mathematics literacy." The inferences that Grønmo and Olsen made about mathematics seem to be entirely applicable to natural sciences.

The root of problems that Russian pupils tend to have with PISA items is apparently that students (as well as teachers) deal little with even raising the question of applying scientific knowledge and skills to solve real-life problems. Meanwhile, the very use of real-life contexts determines nearly all the peculiarities of the PISA tasks presented in Table 3, because:

- A real-life context needs a detailed description, which entails the need to understand and process all the related information;
- The problem contained in the context normally falls into a sequence of consecutive problems or sub-problems, which is captured in the way PISA items are grouped into topical modules;
- A real-life problem often needs a researcher's approach, analysis and interpretation of data available;
- Real-life contexts that make sense for every member of society, including students, often have to do with environmental issues and human health (the "living systems" content domain).

Russia's performance in the other two PISA categories, mathematical and reading literacy, has been improving very rapidly. In maintaining high positions in TIMSS, i. e. "pure" mathematics (ranked 6th), Russian school students have shown considerable progress in applied mathematics, or mathematical literacy, over the latest two PISA cycles (between 2009 and 2015). This achievement, just like the improved results in reading literacy, is sometimes attributed to the newly integrated education standard. Indeed, the education quality requirements stipulated in the Federal State Education Standard of Middle School Education often echo the competencies assessed in PISA. However, the same educational outcomes are expected in natural sciences, yet there has been no progress in PISA-assessed scientific literacy (see Fig. 1). Possibly, the problem here lies in the disintegration among teachers of different scientific disciplines and their understandings of the present-day objectives of science education in school.

By now, we have identified a number of factors describing science education in Russian schools and potentially affecting how pupils score in TIMSS and PISA. Further research must revolve around finding correlations between these factors and TIMSS and PISA results.

Table 4. **Results in TIMSS Advanced (Advanced Physics)**

Country	Average Score	Coverage Index	Years of Formal Schooling	Average Age
1 Slovenia	531 (2,5) ↑	7,6 percent	13	18,8
2 Russian Federation	**508 (7,1)**	**4,9 percent**	**11**	**17,7**
3 Norway	507 (4,6) =	6,5 percent	13	18,8
TIMSS Scale Average	**500**			
4 Portugal	467 (4,6) ↓	5,1 percent	12	18,0
5 Sweden	455 (5,9) ↓	14,3 percent	12	18,8
6 United States	437 (9,7) ↓	4,8 percent	12	18,1
7 Lebanon	410 (4,5) ↓	3,9 percent	12	17,8
8 Italy	374 (6,9) ↓	18,2 percent	13	18,9
9 France	373 (4,0) ↓	21,5 percent	12	18,0

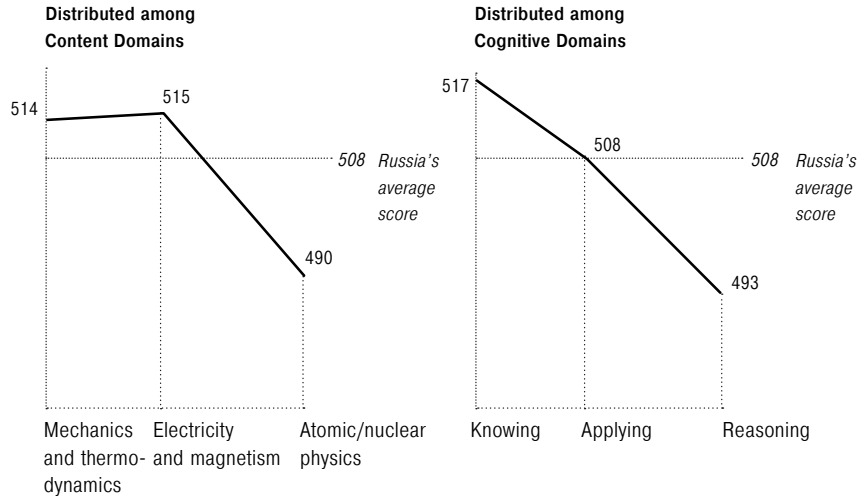
↑ Country average statistically significantly higher than Russia's average.
= No statistically significant differences between country average and Russia's average.
↓ Country average statistically significantly lower than Russia's average.
( ) Standard error of measurement

What Do Russian High School Students' Scores in Advanced Physics Indicate?

TIMSS Advanced is designed to assess final year high school students' performance in advanced physics. Therefore, results in this test can be treated as a small though important fragment in the big picture of science education in school shaped by international studies. Only nine countries participated in TIMSS Advanced in 2015, and Russia scored second highest (Table 4) [Mullis et al. 2016].

The sample of Russian students consisted of eleventh-graders (final year students) who had at least four lessons of physics per week. The key test results contained in the report [Center for Education Quality Assessment, Institute for Strategy of Education Development, Russian Academy of Education 2016d] are largely in line with expectations and thus come as no surprise, except for the steady decrease in Russia's average score over the last three assessment cycles: in 1995, 2008, and 2015. However, a considerable decrease has been observed in all the participating countries except the U.S. and Slovenia. The reasons for the negative trends are yet to be established, but for Russia specifically, one of the factors could be the increased coverage index, which indicates the percentage of young people enrolled in advanced physics programs or tracks in the country's population of the given age group. The coverage index was 1.9 percent in 1995, 2.6 percent in 2008 [Mullis et al. 2009], and 4.9 percent in 2015, i. e. nearly twice as high as in 2008. Of course, the hypothesis about the cov-

Fig. 8. **Results of Russian Eleventh-Graders' Enrolled in Advanced Physics Programs and Tracks, broken down by Content and Cognitive Domains** (International Scale Average)



erage index affecting average scores needs to be tested, but the increase in the number of students enrolled in advanced physics tracks probably indicates an increase in the number of advanced physics classes and teachers within that period. It is not inconceivable that "newly-arrived" teachers of advanced physics did not have enough knowledge and experience at the beginning, which could result in lower levels of student attainment. Anyway, analysis of the reasons for the negative trend in physics in the three cycles of TIMSS Advanced would be one-sided without considering the change in the percentage of high school students enrolled in advanced physics programs.

Results in advanced physics reveal some general peculiarities and deficiencies of science education in Russian schools. In particular, they can be seen from the data on TIMSS Advanced performance in different content and cognitive domains assessed (Fig. 8) [Center for Education Quality Assessment, Institute for Strategy of Education Development, Russian Academy of Education 2016d].

In 2015, Russian high school students scored lower in atomic/nuclear physics than in other content domains. One of the possible explanations is that the relevant domain (usually referred to as "quantum physics") in the Russian advanced physics curriculum is currently the least covered. A very small proportion of USE items focus on quantum physics (Table 5). Conversely, TIMSS Advanced is focusing more and more on this domain at the expense of "mechanics". This balance of the TIMSS Advanced body of tests captures the important trend in physics and other branches of scientific education, which

Table 5. **The Distribution of Items among Physics Content Domains in TIMSS Advanced 2008 and 2015 and in USE-2017**

	TIMSS Adv 2008	TIMSS Adv 2015	USE-2017
Mechanics	29%	40%	30–35%
Molecular physics and thermodynamics	24%		23–25%
Electrical dynamics	29%	25%	30–35%
Atomic/nuclear physics	19%	35%	13–16%

consists in increasing the percentage of the latest scientific knowledge in the content of school classes, especially advanced programs. Indeed, the modern-day avenues of fundamental research (e. g. particle physics or quantum gravity) and advances in technology innovation (e. g. quantum computers, nanotechnology, nuclear and thermonuclear fusion physics) require competence in quantum physics in the first place, which cannot but be considered in the curriculum of advanced school programs.

Curiously, it was in atomic/nuclear physics that Russian eleventh-graders scored better in TIMSS Advanced in 2008 [Mullis et al. 2009]. Perhaps, the focus on the domain decreased between 2008 and 2015 due to adopting a more pragmatic orientation toward the USE requirements and structure. Simple estimates show that if the results of Russian students had been as high in “atomic/nuclear physics” as they were in “mechanics and thermodynamics” and “electricity and magnetism” in 2015 (they used to be even higher in 2008), the average score would have risen to 516–517 and would not have differed significantly from that of 2008.

Russian eleventh-graders perform much better in reproducing knowledge than in tests which assess applying and, even more so, reasoning (see Fig. 8). The distribution of TIMSS Advanced 2015 items among these cognitive domains looks as follows: 30 percent in “knowing”, 40 percent in “applying”, and 30 percent in “reasoning”. However, this distribution appears to be questionable at times. It is quite understandable when constructed-response items asking students to explain, substantiate, or prove something using their own words are classified under the “reasoning” domain. In a number of cases, however, the same domain is assigned in TIMSS Advanced to multiple-choice or short-response items as well. Of course, some kind of internal reasoning always precedes any decision or inference, but classifying such items under the cognitive domain of “reasoning” makes the very boundaries of TIMSS Advanced thinking processes too ambiguous. Nonetheless, the results on advanced physics confirm that science education in Russian schools is oriented toward

teaching students to reproduce their knowledge much more than to apply this knowledge or interpret evidence scientifically.

There is hardly any single factor on which to blame the decrease in Russia's average score on advanced physics over the three cycles of TIMSS Advanced (1995, 2008, and 2015). A comparison of TIMSS Advanced data between 2008 and 2015 does not confirm, for instance, the opinion that students have become less interested in physics and physics-related professions. In fact, the opposite is true: the percentage of students selecting engineering and computer sciences as their future majors among Russian eleventh-graders enrolled in advanced physics tracks increased between 2008 and 2015, contrary to those who chose to major in finance and business [Mullis et al. 2009; Center for Education Quality Assessment, Institute for Strategy of Education Development, Russian Academy of Education 2016d]. Probably, the negative trend in TIMSS Advanced performance has to do with other factors, such as the increased number of students enrolled in advanced physics programs or the decreased focus on the specific content domains which are given ever more attention in the TIMSS Advanced assessment.

Conclusion

A review of Russian school students' science performance in the international assessments of educational quality in 2015—TIMSS for the fourth grade, TIMSS for the eighth grade, TIMSS Advanced for the final grade, and PISA—allows for drawing some conclusions.

Analysis of not only the results but also the frameworks of these studies, developed through a process of collaboration among the participating countries, reveals that the content and methods of science education in Russia are neither unique nor unorthodox, being basically consistent with the global trends.

At the same time, the Russian approach to teaching natural sciences is rather centered around reproducing knowledge than applying it or learning to design scientific enquiry and interpret evidence scientifically. This peculiarity (which has probably developed historically) manifests itself as early on as in elementary school (see Fig. 4), becomes more conspicuous in the eighth grade (see Fig. 7), and persists even in students who choose science (physics) as their major (see Fig. 8). While the TIMSS results only reveal some minor falling behind in "reasoning" and "applying" as compared to "knowing", the overall level of science education being pretty high, in PISA this "peculiarity" becomes a sore point, which shows itself in the lack of scientific literacy among 15-year-old students, who find it the most difficult to understand the practices and procedures associated with scientific enquiry (see Fig. 7).

A separate issue in science education is how biology, or the content domain of "living systems" in PISA terms, is taught in Russian schools. According to the TIMSS data, Russia's average score in bi-

ology is somewhat better than in other content domains in elementary school (see Fig. 3), which should come as no surprise since virtually no material on other scientific subjects is contained in the TWAS curriculum. However, pupils begin to fall behind in biology as compared to other scientific subjects by middle school (see Fig. 6). The PISA "living systems" items present even more difficulty to Russian pupils as most of them fall under the competency "evaluate and design scientific enquiry", which has been the least developed in Russian school students (see Fig. 7). The main difficulty with learning biology probably stems from its content in the Russian curriculum, which mostly consist of descriptions overloaded with information that is hard to make sense of. Meanwhile, students do not develop any good idea of the methods of scientific enquiry that are needed to acquire knowledge in biology.

The results of TIMSS Advanced (advanced physics) indicate that it is not only high school physics but other sciences as well that need their curricula to be modernized to focus more on the recent scientific findings, methods of scientific enquiry, and new technology. Only then will school education satisfy society's growing demand for engineering and research professionals to ensure the development of the innovation economy.

International assessments also serve as indirect evidence of the effectiveness of making science education in school continuous. Most developed countries in the world make it imperative that science be part of the curriculum from the first year of elementary school through to the final year of high school, whether as an integrated course or as a set of systematic disciplines. Throughout the whole period of schooling, science education should always include modules of physical science, life science, and Earth science. In this regard, Russia is definitely at a disadvantage. Under the FSES of Middle School Education, there is no integrated course of science in the fifth and sixth grades, only biology and geography. Meanwhile, it is at the age of 10–12 (which corresponds to the fifth and sixth grades in Russia) that children become highly inquisitive, eager to explore nature, try out and even devise curious experiments. Normally, it is mostly at this age that students develop actively their first research skills and learn the fundamentals of scientific literacy and a scientific worldview, all of this being done within the framework of the integrated course "Science", an analogue of which used to exist in the Russian (Soviet) curriculum for many years. One-lesson-per-week courses in biology and geography cannot solve this problem completely, as they do not allow for setting up a sufficient number of short laboratory investigations demonstrating the specific aspects of the scientific method of enquiry. Besides, the two- or three-year gap in full-fledged science education (Russian students only start learning physics in the seventh grade, and chemistry in the eighth grade) results in a lot of students losing their interest in natural sciences and even forgetting the basic scientific knowledge and skills obtained in elementary school as part of the TWAS course.

One of the main conclusions that can be drawn from the results of the international assessments is that it makes no sense to oppose the rich traditions of Russian education and the modern trends in foreign education, nor does it make sense to oppose fundamental and applied knowledge. This is evidenced by the example of some East Asian countries that demonstrate outstanding science achievements in both domains. Applied learning means that fundamental (purely theoretical) knowledge is applied to solve real-life (practical) problems. To make science education in Russia more "applied", it is necessary to ensure a higher quality and a wider range of problems that are presented to students. It does not require attracting enormous resources but naturally implies enhancing the teaching methods associated with the diverse forms of working with these new types of problems.

The novelty of these findings is that they bring together international assessment data on the quality of science education in Russia at all levels of school education for the first time, making it possible to see the general regularities and problems of science education in school and to identify some of the factors affecting the performance of Russia in TIMSS, PISA, and TIMSS Advanced.

However, the article does not provide any final conclusions about Russian school students' science performance in the international assessments; rather, it suggests hypotheses that can be tested in subsequent studies.

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Research on Student Departure in Russia and the U.S.

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Abstract. Demographic perturbations plus modernizations in the economy and in education have been making student departure an ever more frequent phenomenon, particularly for colleges in economically depressed regions. Research on student departure is in its infancy in Russia, so it appears important to set the basic terminology of analysis, develop a theoretical framework with due regard for the specific features of Russian colleges, and outline the prospects of research development. This study provides an analysis of the existing terminology in research on college dropouts and an overview of the history of such research in the U. S. Analysis of the major conceptions of student departure in sociology, psychology, organization science, and economics reveals the practicability of making allowance for a broad range of diverse factors: social and academic integration, psychological characteristics of students, organizational characteristics of colleges, and education programs. It is vital to remember, when localizing the existing models of student departure, that dropouts from Russian colleges are largely involuntary, caused by academic failures, whereas the foreign models have been designed to describe voluntary student withdrawal. The paper also gives an overview of Russian studies that can serve as a foundation for the development of a Russian model of student departure.

Keywords: postsecondary education, student departure, college dropouts, student expulsion, academic integration, organizational characteristics of colleges.

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Student departure plays an important role in colleges' economic interests and the economy as a whole, being the source of such social problems as the lack of skilled professionals or economic inequality [DesJardins, Ahlburg, McCall 1999]. Dropout rate is a key indicator of college competitiveness in the U.S., demonstrating, on the one hand, the level of college attractiveness (its ability to retain students and keep them from transferring to another college), and on the other hand, the effectiveness of its education policy in terms of student adaptation and assistance.

Translated from Russian by I. Zhuchkova.

While studying student departure has been a long-standing tradition in international research, little attention has been paid to the issue in Russia. Some of the reasons for this include the high tertiary education attainment rate [OECD 2012] and a comparatively low rate of student expulsion. In comparison to the college dropout rate of 43% in the U.S., the Russian index is only 22%, which is nearly twice as low[1] [OECD 2010]. Another possible reason is that Russians associate high dropout rates with college selectivity and a high level of education quality [Gruzdev, Gorbunova, Froumin 2013].

However, the problem of student departure is getting more and more acute in Russia as a result of demographic changes and modernizations in both the economy and postsecondary education. It has become particularly relevant for colleges with low acceptance rates in economically depressed regions, which have been facing a decrease in education quality and a reduction in public funding over the recent years.

The number of empirical and theoretical studies on student departure has been growing in Russia over the last decade. Most studies are descriptive, analyzing particular colleges, and devoid of any theoretical framework. Since the field of research on student attrition is only in its infancy in Russia, it appears important to set the terminology for describing the phenomenon and develop a theoretical framework considering the specific aspects of Russian higher education. This requires generalizing the results of existing Russian studies on student departure while making allowances for the international findings. This article aims to provide a review of studies on student departure in Russia and abroad in order to find the major reasons for student withdrawal and identify the factors that have been qualified as significant in both foreign conceptions and Russian studies. The findings of this study will provide the foundation for building a theoretical model of student departure in Russia. They will be advantageous to researchers designing such models and studying the factors of academic success/failure and dropout. The results can also be applied in practice by college faculty charged with managing the educational process and who are interested in developing a policy to improve educational outcomes and reduce the expulsion rates.

The article is structured as follows. The first section introduces the terms in which student departure is discussed in foreign and Russian studies. The second section outlines the main stages in the development of empirical research and student departure theories in the U.S., where the phenomenon has been studied for over 80 years. The third section dwells into some of the theories describing student departure

[1] This statistical data is applicable to tertiary-type A programs that are designed to provide sufficient qualifications for entry to advanced research programs and professions with high skill requirements. Such programs normally require 4–5 years of study.

from the perspectives of sociology, organization science, psychology, and economics. Next, the major Russian studies on college dropouts are analyzed. Finally, the closing section offers some prospects of research on student departure in Russian colleges, including the development of a theoretical framework, conducting institutional studies, and building a national database to analyze college dropouts.

Terminology of Student Departure

Foreign researchers use different terms to describe student departure, which can be explained by the variety of educational trajectories. These trajectories can be grouped into three large categories, depending on whether a student remains in the college, leaves it but continues studying in another college, or leaves the college and never resumes his/her studies [Habley, Bloom, Robbins 2012]. The term persistence is used to refer to the first category, meaning that students, once admitted, keep attending the selected college. Some authors prefer restricting the term to full-time students who graduate on time. The second category includes students committed to obtaining higher education; however, their studies are discontinuous as they may transfer from one college to another or obtain their degree later than planned. Existing publications describe a few types of students within this category: (i) part-time students and a subcategory of slowdown students, who make a transition between full-time and part-time studies; (ii) transfer students, who transfer from one four-year college to another or from a four-year to a two-year college; (iii) stopouts, who take a short break from their studies and resume them later; and (iv) swirling students, who enroll for more than one college to obtain a degree. Students in the third category—those who leave college and never complete their education—are most often referred to as dropouts. Alexander W. Astin defines this category as students who are not enrolled in college, have not obtained a degree, and do not seek to obtain it anymore [Astin, 1975].

The terms retention and attrition, related to the institutional characteristics, are used for a generalized description of a student cohort [Habley, Bloom, Robbins 2012]. Retention normally denotes students progressing to the next year, whereas attrition, accordingly, refers to students who have not progressed to the next year. Other interpretations of these terms can be found, which indicate completing a degree or a specific course instead of an academic year, or even achieving a specific education goal. Graduation and completion are synonymous to retention and are used most frequently in university management.

Russian researchers have not yet developed a unified terminology to describe student departure, mostly using terms like “expulsion/exclusion”, “academic mobility”, or “incomplete higher education” when referring to the phenomenon [Gruzdev, Gorbunova, Froumin 2013]. They also sometimes use the notion of “attrition”, thus focusing on the

involuntary nature of student departure, which is a predominant trend in Russian tertiary education [Ibid.].

This study will use the term "student departure", which is rather neutral (not emphasizing the voluntary/involuntary nature of departure) and suitable for describing various educational trajectories (whether a student departs temporarily or definitively).

The History of Research on Student Departure in the U.S.

The key eras in research on student departure in the U.S. are analyzed below to trace how the focus of research has changed over time and what college- and society-related transformations have prompted those changes.

The first publications devoted to student departure appeared in the U.S. in the 1930s and were purely descriptive. The most well-known study of that period was performed by John Hamilton McNeely, who analyzed data from 25 universities-11 private and 14 public—in different states to make inferences about peculiarities of student departure depending on the type of college (private or public), student age and gender, selected major, year of study, college location, and other factors [McNeeley 1937].

The next era of research unfolded in the 1960s, as the end of World War II prompted the increase in postsecondary education opportunities for the middle and lower classes as well as for ethnic minorities [Seidman 2012]. Such students would bring a low level of academic attainment to college, so the successful completion rates were very low. As dropout rates spiked, universities began to develop student retention and academic assistance strategies. Studies conducted back then prioritized individual psychological characteristics of students over the institutional characteristics of colleges among the factors affecting student departure [Ibid.].

The 1970s gave rise to theories of student departure, in particular the conceptions of William Spady [Spady 1970] and Vincent Tinto [Tinto 1975], built around Emile Durkheim's sociological model of suicide. The central concept of their theories was the level of academic and social integration that affected students' retention decisions. Tinto's theory has been the most recognized one to date.

U.S. college enrollment rates had begun to decline by the end of the 1970s, so colleges resorted to management, marketing and recruiting practices [Demetriou, Schmitz-Sciborski 2011]. Throughout the next decade, student retention was given paramount importance in strategic college planning.

Most publications from the 1990s are dedicated to the peculiarities of dropout among students of different races and ethnicities, representatives of minorities and low socioeconomic status backgrounds. Many of the studies from that period analyzed the heterogeneity of student composition and sought measures to maintain cultural diversity in colleges in order to increase student retention [Swail 2004].

For example, Tinto argues that dropouts and retention policies should be analyzed separately for African-Americans, students from low-income backgrounds, older students, and transfer students, since they all have had different experiences [Tinto 1993]. In the second half of the 1990s, researchers zeroed in on the transition from high school to college, and many studies sought to find the most effective ways of supporting students during the transition period. Recommendations included augmenting the interaction among college departments responsible for admission, academic assistance and the educational process as well as using the most efficient methods of academic consulting.

A holistic approach to research on student departure has prevailed since the late 1990s [Demetriou, Schmitz-Sciborski 2011]. Studies on student retention stress the need to consider and optimize the interaction between students and instructors, education program managers, academic supervisors, peers, and other meaningful college agents, as these interactions are related to dropouts. Tinto [Tinto 2004] believes that colleges should offer academic, social, and psychological support to students if they want to increase their degree completion rates.

Therefore, the evolution of the theory of student departure in the U.S. is characterized by a constantly growing engagement of colleges in this field of research, emergence of theoretical conceptions explaining college dropouts, integration of research findings in college activities, and growing interaction among all educational process participants with a view to improving student retention.

The Theory of Student Departure: International Findings

Theories of student departure exist in economics, sociology, organization science, and psychology [Habley, Bloom, Robbins 2012]. By providing a review of the major conceptions in each domain, this study does not seek to embrace every theory but to present the key avenues of research on the issue as well as the main categories of the factors analyzed. For a more detailed description of the theories of student departure, see, for instance, [Melguizo 2011; Seidman 2012].

Sociological theories analyze student departure in terms of social structures and forces, attending an academic environment, family status, early socialization patterns, and support from significant others. The most prominent sociological conceptions include the theory of Joseph B. Berger, who uses the concept of cultural capital to analyze the dropout process [Berger 2000], the cultural perception of George D. Kuh and Patrick G. Love [Kuh, Love 2000], and Tinto's student integration theory [Tinto 1975; 1993].

Tinto's theory, proposed in 1975 and later revised by the author [Tinto 1993] as well as other researchers, has been the most recognized. Tinto examines the mechanisms of student departure on the analogy of egoistic suicide, which is committed, according to Durkheim, when an individual does not share all the norms and values of

her/his social group. Tinto sees university as a system with a value and social structure of its own. He points out that social factors affecting student retention are similar to the causes of egoistic suicide in Durkheim's model, i.e. insufficient interaction with other individuals in college and inconsistencies between the values of students and those of the college community. Insufficient social integration results in a low level of commitment to the system, increasing the probability of deciding to leave. In addition to social integration, an important role is played by academic integration, i.e. the extent to which students comply with the educational requirements imposed by the college. Insufficient integration of any type leads to dropout, Tinto believes. At the same time, excessive integration in any of the two environments may result in the lack of integration in the other and thus lead to dropout as well.

Apart from academic and social integration, Tinto's model includes variables of a student's past experience: social status, school experience, place of residence, and individual characteristics such as gender, race, ethnicity, or competencies. Other important elements of the model include motivation, learning expectations (the degree that a student expects to obtain), and institutional obligations (e.g. the obligation to pay tuition fees, the commitment to studying in a particular college or an institution of a particular type). The integration theory revolves around student interaction with the academic and social systems of the college, which results in changes in the individual's goals and institutional obligations, which, in their turn, may lead to various forms of dropout. Therefore, although the goals and institutional obligations that students bring to college are significant components of their academic integration, the processes in which they engage in college are way more important in terms of persistence/departure. Whether a student decides to leave or stay is determined by their daily interactions with professors, administrators, other college staff, and peers in formal and informal domains of the academic and social systems, as well as by how students perceive and assess these interactions.

The integration model analyzes departure from a particular college, not higher education as such, which makes it institutional and not systemic.

Tinto's integration theory remains the most influential and widespread theoretical framework for research on student departure [Melguizo 2011]. Yet, it has a number of limitations. First, it must be acknowledged that empirical confirmation of its ideas has been rather poor [Braxton, Sullivan, Johnson 1997]. Second, Tinto gives very broad definitions of academic and social integration and does not offer any reliable and valid measurement instrument, so authors of empirical studies operationalize these concepts variedly and their findings are difficult to compare [Braxton 2000]. Third, the integration theory leaves unattended a number of factors that are potentially important

for building the educational trajectories: changes in the education funding system on the state and national level, technology advances that are changing the face of student-teacher interaction, and other external processes affecting college activities [Ibid.]. Fourth, Tinto's theory does not exclude possible effects of student self-selection: levels of academic and social integration may be determined by the individual characteristics that students bring to college. Fifth, the theory does not take into account the peculiarities of "unorthodox" students (older students, two-year college students, part-time students, etc.), who attach more importance to employment, family relationships and financial status, or the specific aspects of academic integration of ethnic minorities [Braxton, Sullivan, Johnson 1997; Kuh, Love 2000].

As we can see, one of the limitations of Tinto's theory consists in underestimating the external factors. An attempt to overcome this limitation was made by the theory of student attrition proposed by John P. Bean [Bean 1980], who focused on the organizational characteristics. Taking his cue from Tinto, Bean approaches student departure as a complicated, long-term process, in which student interaction with the social and academic systems of the college is the central factor. Bean, however, draws attention to the effects of factors extrinsic to learning, such as family obligations, the need to work, availability of funds to pay tuition fees, and chances of transferring to another college. Learning satisfaction is thus the basic concept affecting retention decisions in his model.

Bean's model is rarely used in research on student departure as a self-sustainable theoretical framework, rather being coupled, for example, with Tinto's model [Cabrera, Nora, Castaneda 1993].

Along with sociological theories, the factors and patterns of college dropouts are also explained by psychological conceptions that make allowance for the characteristics and processes on both individual and college levels. One of the most popular psychological theories was put forward by John P. Bean and Shevawn B. Eaton [Bean, Eaton 2001]. The authors identify four psychological qualities that promote academic integration of students: self-confidence, healthy coping behavior, self-efficacy, and internal locus of control. When highly-effective students face academic or social challenges in college, they keep pursuing their goal instead of quitting. Self-confident students have no doubts about their success, while their less confident peers give up when difficulties get in their way. Students with an internal locus of control are convinced that they are in control of the situation, whereas externally-oriented students surrender to fate and withdraw from college once they start having troubles with studies or social relations.

Student motivation is another crucial psychological trait used to explain educational outcomes. One of the best-known theories of motivation was proposed by Edward L. Deci and Richard M. Ryan. According to their self-determination model, intrinsic motivation associated with inherent interest for the subject of study correlates positive-

ly with academic achievements, while extrinsic motivation propelling students to seek rewards or avoid punishment shows a negative correlation up to the point where the external regulations for specific behavior get internalized [Deci, Ryan 1991].

Other psychological theories use different constructs to explain student departure, e. g. goal-setting theory, Vroom's expectancy theory, or optimism (for an overview, see [Demetriou, Schmitz-Sciborski 2011]).

In economics, student departure is mostly analyzed in terms of the human capital theory [Becker 1964]. Students drop out when they perceive the costs of studying at a particular college as exceeding the benefits. The costs include tuition fees and missed revenues, while the benefits comprise future remuneration, acquisition of additional skills and knowledge, and life satisfaction.

We have covered the key avenues of research on student departure, having discriminated among the sociological, psychological, organizational and economic perspectives. One of the current trends in this field is about creating interdisciplinary conceptions. For example, John M. Braxton and Amy S. Hirschy brought together Tinto's ideas and empirical findings of the organizational, psychological and economic theories to construct separate models for residential and commuter colleges [Braxton, Hirschy 2005]. The residential college model is focused on the traditional criteria of college admission: academic skills, level of pre-college attainment, ethnicity, gender, parental education, and socioeconomic status. The commuter college model, on the other hand, is built around psychological factors [Habley, Bloom, Robbins 2012].

Search on Student Departure in Russia

There have been very few studies on student departure in Russia so far. The earliest, conducted in the 1960s, analyzed the magnitude and causes of dropouts from Sverdlovsk colleges [Rutkevich 2002]: the authors examined the proportion of expulsed students depending on college type, major, attainment level, year of study, and mode of study (full-time or part-time).

The topic remained outside the focus of researchers for quite a while. It was not until the early 21st century that the first publications on Russian college dropouts began to appear. The majority of them represent descriptive analysis of data from a particular college. For instance, administrative data on six departments of Moscow State University was used to analyze the likelihood of getting excluded depending on such student characteristics as gender, age, place of residence, and mode of study. Students in the selected departments were asked to assess the factors they believed to be crucial in determining the likelihood of exclusion [Chudinovskikh, Donets 2004]. The magnitude and factors of college dropouts were later analyzed on the sample of students enrolled in the MSU in 1993–2001 with due regard for

the economic costs of expulsion [Donets 2011]. The study investigates the likelihood of dropout due to either expulsion or stopout, using cohort analysis for calculations. A number of studies analyze the correlation between student departure and specific student characteristics like USE[2] scores [Timofeeva, Avrunev 2016] or intelligence [Bodryakov, Nigmatullina, Fomina 2009].

Along with descriptive studies, there are studies that use regression models to assess the effects of a confluence of factors on student departure. For instance, both descriptive analysis of event occurrence and the Cox regression model were used to measure the dropout rate and identify the factors increasing the risk of dropping out from the Higher School of Economics in Moscow. The study tested such variables as age of college entrance, gender, field of studies, mode of admission, state- or self-funded status, USE scores, the fact of having a gold medal for high-school achievements, and place of residence before entering the college [Kolotova 2011]. Modern Russian researchers use Tinto and Bean's models in their studies, in particular to assess how academic adaptation of students affects the likelihood of getting expulsed at the end of the first year [Gorbunova 2013]. The author was the first to integrate information from colleges' administrative databases with results of sociological surveys of students to analyze student departure, as well as the first to use structural equation modelling in studying college dropouts in Russia. The findings have confirmed the hypotheses about direct and indirect (attainment-mediated) influence of academic adaptation on student exclusion as well as direct effects of social adaptation. A significant positive correlation between risk acceptance and probability of expulsion was revealed based on student data from a highly-selective Russian university [Kochergina, Prakhov 2016]. The authors believe that risk attitude as an individual student characteristic may influence the process of academic integration (e.g. students more inclined to risk find themselves poorly integrated in the academic system) and determine how successful it is. Olga Kondratjeva and her co-authors analyze the factors of student departure using administrative data from two Russian and eight American colleges. The authors use Clifford Adelman's theory of academic momentum [Adelman 1999, 2006] as a theoretical framework and examine the following indicators of academic momentum: delayed college entry, reporting one's major soon after enrollment, first-year grades, changes in grades, taking remedial courses, and learning persistence during the first period of college studies (number of units or credits obtained). Analysis results demonstrate that higher levels of academic momentum reduce the likelihood of getting expulsed, but this correlation is contingent on college selectivity, student gender, and the field of study [Kondratjeva, Gorbunova, Hawley 2017].

[2] Unified State Examination

A recent study uses network analysis methods to see how the dynamics of peer relationships correlate with academic failure [Valeeva, Dokuka, Yudkevich 2017]. The authors have confirmed the hypothesis on social isolation of students with low levels of educational attainment. Students without academic arrears tend to form stable and long-lasting relationships with one another during the academic year, whereas students with unfulfilled assignments are classified less and less often as friends by their peers and establish fewer and fewer contacts over time. Empirical evidence shows that friendly relations between successful students and low achievers are very likely to be broken off within a year.

Occasionally, some studies use qualitative data to analyze student departure, e. g. the role of faculty in college dropouts [Gruzdev 2013]. Foreign theories pay little attention to qualitative data, most studies in the field being focused on examining student departure through the individual characteristics of students. Using the results of unstructured interviews conducted in four Russian colleges of different types, the author provides a classification of attitudes that faculty members tend to adopt in assessing students. The typology is based on three criteria: requirement-oriented selection (how strictly a teacher follows the course program requirements when assessing students), characteristic of the institutional culture (student assessment and expulsion criteria prevailing in the academic community of their department), and perception of the institutional culture (whether a teacher shares the student assessment and expulsion criteria prevailing in the academic community of their department). Ivan Gruzdev describes six possible teacher roles in student assessment: "gardener", "fan of make-up tests", "forest generalist", "quota allocator", "cultivator of 'A' students", and "Mr. Nice Guy". According to the author, various ratios of these roles in faculties may explain the differentiation of departments (or majors) by the dropout rate.

Discourse analysis of semi-structured interviews with instructors in nine other Russian colleges provides grounds for consolidating all the student departure narratives into a metaphor of a trial, with discrimination among the discourse of a prosecutor, that of a judge, and that of a lawyer [Terentyev, Gruzdev, Gorbunova 2015]. On the whole, the teacher discourse is always denunciative with regard to students. This is most clearly seen in the prosecutor's discourse, yet the other two versions also place the responsibility for dropouts on students.

Elena Gorbunova, Olga Kondratjeva, and Joshua D. Hawley assessed the factors of departure among students of engineering and economic majors based on semi-structured interviews with college faculty, administrators, and dropouts of one American and two Russian high-selectivity colleges. The authors identify two groups of factors describing the causes of student departure: those related to challenges in academic integration (low level of high school attainment, difficult course program, inconsistencies between college and high

school teaching methods and learning standards, overestimation of one's academic competencies, and insufficient diligence) and those related to their psychological characteristics. Results of the interviews with dropouts indicate that the conflict of interests between learning and other spheres of student life as well as changes in a student's priorities amidst the learning process lie at the heart of academic failure and student departure [Gorbunova, Kondratjeva, Hawley 2016].

As can be seen from the above, the field of research on college dropouts in Russia is at its infancy stage. Yet, the available findings are enough to assert that the significant factors of student departure in Russia include individual student characteristics (gender, age, level of high school attainment, diligence, and academic performance), faculty attitudes toward student assessment, college policies for managing poor performance, social environment of students, and institutional parameters (college selectivity, selected major). Meanwhile, the psychological mindset of today's students is characterized by finding one's own identity in both personal and professional development as a vital goal of college education.

The Prospects of Research on Student Departure in Russia: Theoretical Framework, Data, and Objectives

This study provides an overview of terminology used to describe student departure, the major stages of student departure research in the U.S., and the most influential theories in sociology, psychology, economics, and organization science.

The overview of foreign theories allows grouping the factors of student departure into three categories: individual characteristics that students bring to college (social status, gender, ethnicity, race, family and financial status, competencies, and level of high school attainment), characteristics of the learning process (academic and social integration, changes in learning motivation, coping behavior, and learning satisfaction), and institutional characteristics (college selectivity, course difficulty, etc.). Having an idea of the factors of student departure, colleges can develop policies to provide academic, social and psychological support to their students.

There has been a rapid growth in the number of Russian studies on student departure lately. Most publications are descriptive, analyzing data from particular colleges, and devoid of any theoretical framework. However, more and more studies elaborate the concept of Russian college dropouts, compare data from several colleges, conduct comparative analysis of college dropouts in Russia and abroad, and use advanced methods of data analysis.

It is becoming an urgent necessity to develop the theoretical framework of research on student departure in Russia. Such a framework certainly can include elements of foreign theories, yet allowance should be made for the peculiar aspects of Russian colleges. Unlike in the U.S. system of postsecondary education (which is at the heart of most existing conceptions of student departure), where decisions

to withdraw are largely taken by students voluntarily, Russian students are much more often expulsed as a result of an academic failure. Consequently, the model for Russian colleges should prioritize factors that affect academic performance and the probability of encountering difficulties in learning. The model may include processes of social and academic integration but probably not as its primary factors. Data for developing the model of student departure in Russia can be obtained from Russian studies on college dropouts, including those that use qualitative methods (interviews with students, college faculty, and administrators). Development of such a model implies defining exactly the subject of research, i. e. which of the events that can be classified as student departure is meant in each specific case: withdrawal from college, stopout, suspension, etc.

Institutional research on particular colleges appears to be a promising avenue of study in the field of student departure. Such studies can use administrative databases containing information on student enrollment (sociodemographic characteristics, admission test results, high school grades) as well as the educational process and outcomes (academic load, educational attainment and its dynamics). This data does not allow for taking into account all the factors affecting college dropouts, but analysis results can be used by college administrators to predict which students are likely to be at risk of exclusion and develop student retention policies. Such results can be complemented with data from interviews with various agents of the educational process in a particular college.

Creating an information database is an important task in the context of promoting Russian research on student departure. Some countries possess centralized databases aggregating the history of student enrollment and studies from a few colleges, often a category of colleges. For example, the Higher Education Information System in the U.S. contains the individual characteristics of students in all state-supported Ohio colleges and universities. It includes detailed demographic, enrollment, course and financial aid data on every student. Developing a similar database in Russia would make it possible to obtain representative data on the trends of student departure as well as propose initiatives to reduce dropout rates on a national level.

Organization of national longitudinal surveys of Russian college students will allow for analyzing a wider range of dropout factors and test the theoretical models of student departure. Some projects of this kind have already been initiated. The intercollege research project Trajectories and Experience of Russian University Students (TERUS)[3] is being implemented as leading universities are networking under Project 5–100. TERUS is an annual survey of college students, from freshmen to seniors, which is complemented with administrative data

[3] https://ioe.hse.ru/collaborative_project/about

on educational attainment, student allowance, and financial aid. Data has been collected since 2015 and will continue to be gathered until 2020. Within a few years, this data can be used to analyze the factors of academic performance and dropouts in Russian colleges. It is advisable to start longitudinal studies of this type in secondary school, e. g. from the eighth grade, as in the USA's National Educational Longitudinal Study[4], or senior grades, as in the USA's High School & Beyond[5], in order to take due account of additional factors that could potentially have an impact on student departure: the influence of parents and peers on educational trajectories, characteristics of school experience, career and educational aspirations at such crucial transition moments as finishing the eighth grade, taking exit examinations, or entering college.

Therefore, the most promising avenues of research on student departure in Russia appear to consist in designing the theoretical framework, conducting institutional studies on college dropouts to enhance the educational process quality, and developing the research database (creating a cumulative base of administrative data from public colleges on every student's history of studies and organizing national student surveys).

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[4] https://nces.ed.gov/surveys/nels88/

[5] https://nces.ed.gov/surveys/hsb/

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University Alliances: Enhancing Control, Capacity, and Creativity in Dynamic Environments

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Abstract. During the last few decades a high number of university alliances and strategic partnerships between higher education institutions have been established all over the world. This development can be interpreted in different ways and the article offers some theoretical perspectives relevant to understanding the emergence of and the engagement in institutional collaborations, and how such collaboration affects the field of higher education. The article argues that alliances between universities are ways to enhance organizational capacity but also to take control of more competitive environments. Furthermore, alliances and partnerships can also be seen as the means to enhance organizational creativity and innovation in more organic ways. The paper gives an empirical illustration of how alliances develop and transform over time, and discusses possible long-term implications of alliance formation in the higher education sector.

Keywords: higher education sector, convergence, divergence, university alliances, strategic partnerships, meta-organization, The American Association of Universities.

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Introduction

Internationalization and globalization of higher education have risen to the core of policy agendas throughout the world during the last decade. Following this political interest, there is a growing bulk of research on internationalization and globalization issues aimed at offering better definitions and more conceptual understandings of this phenomenon [de Wit 2002; Marginson, Rhoades 2002; Kehm 2003; Vaira 2004; Huisman, van der Wende 2004]. Still, much diversity and fragmentation can be said to characterize the research efforts so far [Beerkens 2004; Marginson, van der Wende 2007; Maringe, Foskett 2010]. Examples of the wide research focus include analysis of the interrelationship and differences between internationalization and globalization of higher education [Knight, de Wit 1995; Enders, Fulton 2002; van Vught et al. 2002; Knight 2004; Altbach, Knight 2007], studies of

geographically bounded processes including the Bologna process in Europe [Teichler 1999; Horie 2002; Gornitzka, Langfeldt 2008; Marginson et al. 2011], for-profit higher education and academic capitalism [Morey 2004; Slaughter, Cantwell 2011], international student and staff mobility [Santiago et al. 2008; Wildavsky 2010], global university rankings [Deem et al. 2009; Kehm, Stensaker 2009; Hazelkorn 2007; 2011], and university alliances and network establishments [Beerkens 2003; 2004; Beerkens, van der Wende 2007; Olds 2009; Sakamoto, Chapman 2011; Gunn, Mintrom 2013;, Vukasovic, Stensaker 2017].

All these studies point to a changing higher education landscape where the key higher education institution—the university—is also changing [Marginson 2002; Bartell 2003; Currie et al 2003; Salmi 2009; Ramirez 2010; Wildavsky 2010; Hazelkorn 2011]. Some authors also provide rather more concrete statements concerning the implications of these change processes, suspecting growing convergence following the globalization where the western university model and way of organizing is being emulated throughout the world [Wildavsky 2010; Ramirez 2010].

Conducting a more detailed empirical analysis of the convergence thesis is interesting for several reasons. First, while many studies of the higher education landscape specifically tend to emphasize communalities and converging trends in policy-making, we have few studies demonstrating the actual transformations taking place. Often, organizational structures are used as a proxy indicator for convergence in organizational behavior, although such structures have clear limitations as measures of organizational change [Stensaker 2004; Enders 2004]. Since higher education institutions are organizations with deeply embedded values, cultures and traditions, formal structures are often poor predictors of academic performance. As such, it can be more interesting to study the actions taken by individual higher education institutions, especially concerning how they maneuver and position themselves in the field they are embedded within.

Second, by focusing upon higher education institutions and their attempts—individually and collectively—to position themselves in the environment, we can perhaps also learn more about the mechanisms involved in processes related to convergence and divergence in the higher education sector. While analysis of student and staff mobility, changes in funding schemes, and various policy initiatives regarding joint degrees or collaborative research, all contribute to change along several dimensions, a focus upon the institutional level enables us to create a more overarching and better informed understanding of the changes in higher education [Taylor 2004; Teichler 2007].

While higher education institutions can be `strategic` in a number of ways, an emerging trend in higher education is the increasing number of national university alliances and networks emerging [Gunn, Mintrom 2013; Stensaker 2013]. Some of the most well-known of these networks are the Russell Group in the UK, the Group of Eight

in Australia, the U15 in Canada, and SKY in South Korea. Also internationally, numerous university networks or consortia have been established during the last few decades such as LERU and the Guild in Europe, and the more globally focused including IARU and the African Research University Alliance in Africa. Hence, university alliances are fast becoming a global phenomenon.

The purposes, activities and profiles of university alliances differ [Beerkens 2004; Olds 2009; Stensaker 2013], and the objective of the current article is to offer some theoretical perspectives for understanding the establishment of university alliances and how these may develop over time, and, in essence, to sketch out their potential impact on the higher education landscape. As such, the article also aims at informing the debate on whether university alliance establishments can be seen as an example of increasing convergence in higher education or whether such alliances are rather an indication of a growing stratification of higher education pointing to several 'layers' of institutions in the future global market for higher education [Stensaker 2013].

University alliances—the rise of `meta-organizations` in higher education

In higher education, key global policy trends in recent decades have often been related to de-regulation, the stimulation of competition among universities and colleges, and the need for more institutional autonomy to enable the institutional competitiveness [van Vught et al 2002; Slaughter, Cantwell 2011]. These policy ideas have travelled effortlessly between continents and between countries [Czarniawska, Sevón 1996] and resulted in new routines and standards for what is perceived as proper governance [Brunsson, Jacobsson 2000], and affected the modes of collaboration and competition [Djelic, Sahlin-Andersson 2006]. Not least is it possible to identify the growing importance of ´meta-organizations´—new organizations where other organizations are members—which through collective actions and new forms of cooperation develop capacity for influencing society in which they are embedded [Ahrne, Brunsson 2008; Torfing 2012].

Such ´meta-organizations´ can be seen as structures that are i) a functional response to a more complex and competitive society, ii) a strategic solution to problems individual organizations are unable to respond to, or iii) a transformation of the organizational field [Torfing, 2012]. These three explanations are not mutually exclusive, but they provide some distinct lenses through which university alliances can be analysed, not least through their links with established theoretical perspectives in the studies of organization.

First, the establishment of university alliances can be seen as a functional response to a complex society—both nationally and internationally. In a world that is increasingly complex, containing new types of actors and with new markets emerging, establishing an alliance could be seen as a response mechanism for organizational sur-

vival and for increased control in a situation perceived as uncertain. This argument is central in neo-institutional theory which postulates that in situations characterized by uncertainty, organizations imitate other organizations that are perceived as successful [Labianca et al. 2001], that this imitation is triggered by environmental pressures for legitimacy [Hall, du Gay 1996], and that such pressures often can be described as meaning structures that force an organization to behave in ´rationalized´ ways [Ramirez 2010]. As a result, organizational changes will lead to convergence and increasing conformity by triggering reproduction and reinforcement of existing modes of thought and organizations [Scott 2001; Drori et al. 2006]. As concepts such as excellence and `world-class` are frequently mentioned in higher education policy discourse [Hazelkorn 2007; 2011], such purposes are likely to stimulate the establishment of alliances reinforcing such perceptions, although attempts related to gaining control also may have other rationales depending on what are perceived as the dominant ideas in the environment [Knight 2004].

Second, university alliances could also be seen as a strategic solution to problems individual organizations are unable to cope with on their own, and where some kind of cooperation is relevant. This kind of perspective has often been applied in analysis of organizations collaborating in the private sector, and is often linked to how critical resources—economic, political or technological—can be secured through formal organizational collaboration. This is an argument often associated with resource-dependence theory [Pfeffer, Salancik 1978] although it can also be linked to older forms of institutional theory [Selznick 1957; Greenwood, Hinings 1996]. The focus in this perspective is how organizations intentionally and in a more strategic fashion analyze their options and make informed choices as to how survival and prosperity can be achieved. In this perspective, being both similar to or different from potential competitors are possible options [Middlehurst 2002], although the logic associated with the resource-dependency is about how a more unique position can be established in an organizational field (Santiago et al. 2008). As a consequence, university alliances could be seen as an attempt to create special niches and build unique positions and capacity other organizations or alliances would find difficult, or even impossible, to imitate.

The two first perspectives can be associated with organizations acting in passive (functional) or active (strategic) ways when facing challenges in the environment. However, it is also possible to argue for a third perspective, characterized by a more organic view of organizational choice and change. This perspective, often associated with Scandinavian institutionalism, shares the neo-institutional view that powerful ideas and templates are found in the environment, but that there is an active agency found by those trying to make sense and adapt to these ideas [Czarniawska, Joerges 1996]. As a consequence, imitation is less about conformity and more about innovation and or-

ganizational learning [Sevòn 1996], not least due to the ability of organizations to edit and transform ideas in creative ways [Sahlin-Andersson 1996]. In this perspective, similarities and differences can occur in parallel processes, and there are many possible outcomes as analyses are made, options considered and decisions taken [Stensaker 2004]. The establishment of university alliances is in this perspective more dynamic and unpredictable, where purposes and activities may shift and transform over time.

To sum up, the three perspectives suggest that university alliances can serve different purposes including that of taking control of the environment, strengthen organizational capacity and enhancing creativity in a more competitive and dynamic higher education landscape. As indicated earlier, the perspectives are not necessarily mutually exclusive, and they may overlap, not least in a longer time perspective as environmental drivers change along with the internal dynamics of the focal alliance. For example, while members of alliances in general can be seen as having an interest in cooperation, they may at other times still see other member institutions as potential competitors, which may change the internal dynamics of an alliance [Ahrne, Brunsson 2008].

An empirical illustration of the theoretical perspectives—The American Association of Universities (AAU)

As many of the current university alliances are quite young, especially in relation to the age of many of their member organizations, it is difficult to find good empirical examples concerning how alliances may change and transform over time. However, there is one alliance that differs considerably from many others with respect to age and which currently is closing in on the 120th anniversary of its establishment: The American Association of Universities (AAU)[1]. As such, the AAU is an interesting alliance to analyze, not least to identify possible shifts in purpose and functions over time.

The AAU is an old alliance formed in 1900 when 14 US universities came together to form a joint association due to experiencing problems concerning the reputation of US higher education at that time. Due to the rise of diploma mills and universities with dubious academic standards at that time, leading European institutions were increasingly skeptical about receiving US students, and the Presidents of the universities of Chicago, Harvard, Columbia, Johns Hopkins and California joined forces to advance the standards of “our own weaker institutions” as they formulated it in the letter of invitation to the other founding institutions [AAU 2000]. As many US universities were

[1] The historical description of the AAU is primarily based on “The Association of American Universities: A century in service to higher education 1900–2000” [AAU 2000], although other sources have been added to improve reliability and account for field level developments [Geiger 1986; 2004; 2009; Kerr 2001;, Berman 2012].

formed on the German university model [Geiger 1986], establishing good links with these universities and acquiring their acceptance was a strong rationale behind the establishment of the association. However, Geiger [1986] has also suggested that the forming of the AAU was a way to keep the promising students in the US, and to strengthen the quality and independence of US higher education. Kerr [2001: 118] has in addition suggested that the AAU also contributed to shaping and reproducing the reputational characteristics of the higher education system in the US. Due to the lack of a strong federal influence early on, associations such as the AAU played an important role in structuring a very decentralized system.

After the founding meeting in 1900, two major measures were taken by the 14 AAU universities. First, the members of the association agreed to implement a set of academic standards related to their educational offerings and, second, to promote these standards externally—both within the US and abroad. These steps were highly successful, and German universities soon started to use AAU membership as key admission criteria for US students. Other non-AAU US institutions wanting to acquire the same reputation soon asked for AAU membership, but as the association wanted to remain rather small and exclusive, many of these were turned down. However, the AAU offered to develop a list of US institutions which were seen as upholding proper academic standards, and the so-called "AAU Accepted List" became an important quality assurance tool for the expanding US higher education. Even if regional accreditation bodies were established, this list was seen as an equivalent to formal accreditation until it was terminated in 1948 [AAU 2000].

During WWII, the relationship between the AAU and the Federal Government in the US changed significantly [Geiger 2009]. As research conducted in US universities in general and by AAU members in particular had contributed to numerous scientific discoveries during the war, the Federal Government wanted to increase the funding directed at research-intensive universities, and in order to handle the newly established relationship with Washington the AAU was `taken over` by the Presidents of the member universities and became an organization more linked to federal policy processes and funding issues. As new policy and funding bodies developed after WWII (including NSF, NIH, and the research organization of the Public Health Service), new streams of money and resources were directed towards US higher education and especially to AAU member universities (see also [Kerr 2001]). The level of funding increased particularly after the Soviet-Union launched the Sputnik satellite towards the end of the 1950s and remained at a high level until the 1970s [Geiger 2009]. It was during the latter part of this period of expansion that the AAU established its first Washington office (1962), an establishment that was later followed by the establishment of a special Council on Federal Relations in 1969. During this period, the AAU started to develop some internal

tensions as a result of the fact that the association had a collective interest in expanding the total funding level directed towards research while members also wanted to increase their own shares of this funding. The latter process was often conducted by individual members of the AAU lobbying federal politicians, and arguing for earmarked funding to individual universities [AAU 2000].

Due to problems in the US economy during the 1970s, funding to research universities was reduced and many AAU members experienced economic challenges as a consequence, not least due to rising administrative costs due to the emergence of new federal policy initiatives such as increased student aid, affirmative action, and other public regulations affecting US universities. In this period, the AAU became even more formalized and after a planning period stretching from 1971, the association hired its first president in 1977, and rapidly built up a professional staff supporting the appointee. This professionalization of the association soon resulted in the development of a range of activities and new committees, clearinghouses for research, etc.

In the 1980s, US policy-making was introduced to `Reaganomics` which meant de-regulations at federal level and the introduction of a higher education sector more characterized by competition and market solutions [Geiger 2004; Berman 2012]. The links between research universities and economic development were as a consequence strengthened not least through federal regulations such as the Bayh-Dole Act on technology transfer [Berman 2012]. The increased competition was met in various ways by US higher education, and while some institutions tried to become entrepreneurial—sometimes resulting in research misconduct especially in the booming field of biomedical research [Greenberg 2007]—others sought to protect themselves from the competition by lobbying the policy-makers for earmarked funding [Geiger 2004]. The latter business, which has caused considerable turbulence within the AAU since the 1970s, escalated and members split in their view on whether federal resources should be distributed through competition or earmarking. In the latter group of AAU members, several built up their own federal lobbying offices in Washington.

One issue nevertheless united the AAU members in this period. This was related to the federal wish to increase the efficiency of research funding by cutting the `indirect costs` related to the research grants obtained [AAU 2000]. By cutting indirect costs, the federal level effectively increased the economic burden of those receiving the grants forcing universities to use some of their own funds to co-finance the research undertaken [Ibid.]. While this issue has been high on the agenda of the AAU since the 1980s, it remains a challenging area for the association even today.

As the federal policies emphasizing competition have continued into a new millennium, the AAU has become more attentive to issues

concerning reputation and status during recent decades. Although the association currently has 62 members and is considerably larger than many university alliances established in other parts of the world during recent times [Vukasovic, Stensaker 2017], the association still remains rather exclusive given the fact that there are around 3.500 institutions in the US. US higher education has also seen the rise of other university alliances alongside the AAU, such as the American Association of Community Colleges (AACC), the National Association of State Universities and Land Grant Colleges (NASULGC), and the National Association of Independent Colleges and Universities (NAICU), but none of these alliances carry the same reputational status as the AAU.

The majority of the AAU founding universities were private, but the association grew steadily over the years, and in 1909 eight public universities had already joined, leading to a quite balanced public-private institutional membership. Currently, the AAU membership also includes two Canadian universities—McGill and Toronto—making the association in principle into an international alliance. Membership of the AAU is by invitation only, and while the history of the AAU is mostly about growth, some universities have during the latter decades left the association—some voluntary while others have had their membership terminated.

In 1999, one of the founding members of the AAU, Clark University, left the association and was followed by another founding member, the Catholic University of America, in 2002. While these universities were said to have left the association voluntarily as their mission had diverted significantly from that of AAU members over the years, more controversy came to the fore in 2011 when two other universities, Nebraska and Syracuse University, left the AAU after some heated internal discussions about the future profile of the AAU [Lederman, Nelson 2011]. Due to public questioning about the exclusiveness of AAU members, the association undertook an internal review of the research performance profile of its members, a process that ended with the association voting to terminate the membership of Nebraska University (Syracuse University left voluntarily). While both Nebraska and Syracuse argued that their research performances were quite good, both institutions suffered from a lack of a medical school boosting a research profile in biomedical and life-science areas [Ibid.].

Currently, the AAU is continuing its lobbying for federal support in Washington. But as federal spending on higher education in the US currently is proposed to be cut further from previous levels, the AAU seems to face a continuous challenge in trying to secure federal dollars while the members of the association are embedded in fierce competition for the funds available—a competition not everyone can win, and which will probably put further strain on the association in the years to come.

Theoretical perspectives on the transformation of the AAU

As illustrated in the brief synopsis of the AAU history, the association has undergone several transformations over time. Using our theoretical perspectives as points of departure, it can be argued that the establishment of the association can be linked to a strategic ambition of building capacity—both domestically and internationally. By developing a set of academic standards and actively promoting them, AAU can be said to have started out as an accreditation institution, before the accreditation systems was actually invented in the US [AAU 2000]. The ambition of being accepted internationally was not so much spurred by economic issues as by building reputation and by the wish to brand US higher education (cf. [Geiger 1986]). In this regard, the institutions clearly had a collective interest, and joined forces to build the reputation they perceived as difficult to achieve individually.

Due to changes in the funding regime in the US after WWII, the association transformed quite rapidly in 1949–50, and soon became an association for Presidents of the member universities, rather than for those that cared more about the quality assurance role the AAU had initially focused on. The establishment of strong federal links and the opening up of a Washington office with a special AAU President in charge of the daily running of the association fits well with the perspective of alliances as a way to gain more control in a changing environment. As the federal spending directed at US higher education steadily increased in the decades after WWII, and as AAU members traditionally have received a considerable amount of research money from federal agencies and funding bodies, the AAU became quite a successful interest organization in this period, focusing on internal US higher education policy issues rather than on building reputation on the international arena.

However, as the economic climate changed during the 1980s, the AAU also discovered some of the potential problems of meta-organizations; the challenge to balance joint cooperation with internal competition [Ahrne, Brunsson 2008]. It is quite interesting that it was during this period that the AAU became more professional as an association—through expanding the staff in the Washington office. This expansion can be explained in several ways; either as a sign of a `drift` in the activities of the AAU, or as a sign of disinterest in the AAU by their members as they wanted to secure important resources directly from policy-makers in Washington. There is empirical backing for both explanations as the association in this period expanded its activities into a range of new areas including establishing a clearinghouse for research, and the development of a new unit for institutional data analysis, while individual AAU members also opened up their own lobbying office in Washington. The former explanation fits well with the perspective of university alliances as arenas for creativity, where new activities and collaborations emerged [AAU 2000]. For example, during the 1980s and 1990s the AAU became very innovative in promot-

ing the association by building up and strengthening the public affairs functions within AAU member institutions.

Hence, it can be argued that the AAU in a situation more characterized by growing internal competition and tensions regarding federal resource distribution, again shifted focus and `re-discovered` the advantages of boosting the reputational dimension of the association. As federal policies are continuing to emphasize competition, the AAU can be said to have a greater interest in making a stricter distinction between those being members and those on the outside as reputation may have a positive impact on competitive funding [Geiger 2004]. The termination of membership of institutions that performed poorly according to AAU standards is a sign of an association caring more about its reputation than before (the AAU had expanded its membership for 99 years before Clark University departed from the association in 1999). The perspective that fits this latest transformation is again that of trying to take control—this time of the reputation of the AAU through firmer management of the criteria related to the membership.

If we are to interpret how the theoretical perspectives fit with the assumptions related to convergence and divergence of the higher education landscape, one could argue that the establishment phase of the AAU was characterized by an attempt to create a distinct association nationally, although the AAU at the same time clearly was trying to emulate what were considered as leading universities internationally. When the AAU became more oriented towards federal policy-making, it started to resemble other US university alliances such as NAICU and NASULGC—acting more like a typical interest organization and behaving in much the same way as other alliances competing for the same federal resources. However, during the last few decades, it is possible to argue that the AAU has once again been trying to emphasize its distinctiveness compared with other alliances and institutions in the field—although their role as an interest organization for their members still seems intact. These shifts are theoretically interesting as they indicate that processes of convergence and divergence are not constant as suggested in neo-institutional theory [Scott 2001], but shifts over time dependent on the dynamics taking place in the field the alliances are embedded within. As such, the transformational perspective appears as very relevant to understanding alliance developments over time.

Conclusions and possible implications

The current article has offered different theoretical perspectives regarding the establishment, function and effects of university alliances. As illustrated by the keywords of control, capacity and creativity, university alliances may have different ambitions, and as illustrated by our case study of the AAU, purposes and roles may shift over time triggering both processes of diversity and conformity within the field of higher

education. As such, one conclusion is that meta-organizations such as university alliances represent a dynamic element between macro- and micro-level structures. These alliances may shape both the environment they are part of—for example as when the AAU managed to enhance the reputation of US higher education—as well as the individual member universities—for example by forcing them to comply with the joint academic standards of the AAU. However, alliances do operate in an environment and contextual changes—for example when funding regimes and streams changed in the US after WWII—can effectively transform an alliance in a radical way. As suggested by Selznick [1957], such institutional changes may be more radical when new actors come in and take over responsibilities and important functions such as when the AAU became an association for university presidents in the early 1950s. As such, university alliances can be seen as interesting instruments for purposeful agency. What is often considered as a weakness of meta-organizations—their problems in joining forces [Ahrne, Brunsson 2008]—can actually represent an `open` structure for those willing and able to exercise power (see also [Gunn, Mintrom 2013]).

The case study offered has provided empirical evidence of dynamic shifts between periods of convergence and divergence in university alliances, and as such, has offered nuances regarding the convergence theses which tend to dominate the discourse concerning the future landscape of higher education [Hazelkorn 2011]. It seems that issues of differentiation are more likely to take place when the focal meta-organization perceives it has become too similar to other alliances. This may suggest that processes of convergence and divergence are related to the dynamic and ongoing processes of comparisons between organizations [Stensaker 2004]. Of course, as the current research has only studied one particular case, and as the AAU is a geographically quite distinct alliance, more research is needed on how other national and international alliances potentially shape the global higher education landscape.

Nevertheless, if we are to speculate about the future ways university alliances may impact higher education, our case study indicates several possible implications. First, university alliances are dynamic entities that may shift purpose and roles over time. As such, they represent an interesting instrument for institutions to join and to influence. Second, the fact that the AAU is currently heading towards its 120th birthday also suggests that these alliances perhaps can be rather permanent constructions, although their membership may shift over time. As such, we may face the emergence of a new layer in the ways higher education sectors are organized both nationally and globally. Third, the fact that the AAU for some time has included two Canadian universities as members, may also hint to a future where the categorization of university alliances into either being domestic or international, is of less relevance, not least due to how globalization may impact the traditional boundaries of higher education.

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University Mergers: The Implications for Students

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Abstract. The "human factor", i. e. conflicts and protests of students and employees, often becomes a key problem during and after university mergers. Those transformations, which occur under a reorganization and which are subjectively visible and important for students, are analyzed from the perspective of the theory of radical organizational changes in this article. Four cases of Russian university mergers are considered. The clusters of key "formal" and "informal" changes for students who studied at universities during their reorganizational process were identified based on the data obtained in individual and group interviews with students. The changes in the subjectively recognized prestige of the university diploma and the potential status of students as future graduates of a particular university were the most significant ones from the students' point of view. At the same time, students hardly mentioned the content of the curriculum and the objective indicators of the higher education institutions' quality by discussing the benefits or losses associated with the reorganization. Students often noted the changes occurring in the educational process, formal and informal communication within the university, university culture and the "atmosphere". Based on the results of the study, it is possible to estimate the characteristics of the university, which students pay close attention to during the reorganization and which, therefore, have to be taken into account by planning and conducting university mergers.
Keywords: university mergers, amalgamation of universities, university takeovers, educational policy, organizational changes, student experience.

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University mergers are quite common practice, implemented and analyzed in many countries: in Australia [Gupta, 1990; Harman 1991], China [Mao, Du, Liu 2009; Mok 2005; Zhao, Guo 2002], Romania [Andreescu et al. 2015], Spain [Delgado, León 2015], as well as in Scandinavian countries [Aagaard, Hansen, Rasmussen 2016; Kyvik, Stensaker 2013; Norgerd, Skodvin 2002; Ursin et al. 2010; Stensaker, Persson, Pinheiro 2016]. Several waves of university mergers and takeovers have also been carried out in the Russian Federation, their progress and results have been studied mainly in the context of the management of higher education systems [Klyueva, Klyuev 2010;

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Melikyan 2014; Pavlyutkin 2014; Romanenko, Lisyutkin 2017; Salmi, Froumin 2013].

Initiation of university mergers is often used as an instrument in large-scale state programs. Their goals can be different: from higher education pay cuts to creating a network of highly rated integrated super-universities. The process of merging is a serious challenge for each university and requires a careful analysis of all the potential difficulties and opportunities. Among the most common problems that arise after university mergers, along with the transformation of the organizational structure or the distribution of funding, the researchers note the "human factor": interaction between staff members, who are different because of their university culture, criticism of reorganization, talebearing and subsequent conflicts among teachers and students from partner universities [Harman 2002; Norgerd, Skodvin 2002].

Students are rather seldom mentioned in the academic and analytical literature on university mergers and only as:

a) a source of issues—as participants in protests and conflicts caused by the reorganization [Aula, Tienari 2011];
b) a quantitative indicator that specifies intra-university changes [Melikyan 2014; Mathisen, Pinheiro 2016];
c) one of the arguments for the need for reorganization—for example, an amalgamation is described as a potential opportunity for a larger selection of study programs for students [Harman, Harman 2003; Skodvin 2014; Ursin et al. 2010].

At the same time, the experience and attitude towards reorganization of those students who studied at the time of university mergers have not become the subject of a special study yet. This article fills the gap to create the basis for managerial decisions under university mergers, and also to characterize the interests of students in modern universities through analysis of the situation regarding university changes.

1. The national context of the study of university mergers

The motives and principles of university mergers in Russia, as well as typical problems that arise, are similar to cases of university mergers and acquisitions abroad, hence the results of Russian studies can be extrapolated to some extent to other countries. Nevertheless, the management of university mergers in Russia has a number of features that complicate these mergers and determine the relevance of research on university mergers specifically concerning changes in student positions.

In order to identify the characteristics that are fundamental to the national context of the research, we analyzed several waves of university mergers in Russia: a) the amalgamation of post-Soviet specialty colleges for the creation of classical universities in the 1990s; b) the creation of federal universities in 2006–2012; c) the joining of higher

education institutions recognized by the results of the Monitoring of Effectiveness of the universities of the Ministry of Education and Science of the Russian Federation as ineffective since 2012; d) the creation of regional flagship universities since 2016 [Romanenko, Lisyutkin 2017].

Firstly, it was specified that most of the mergers are organized in a "top-down" approach, i. e., they were initiated not by the universities themselves after long-term cooperation, but by external stakeholders—federal and regional management and included in major state processes of higher education system reorganization. In some cases these processes even occurred involuntarily.

Secondly, in international experience, an amalgamation is not the one and only option, but rather an extreme form of cooperation between universities. There are also such interaction options as alliances and consortia [Harman, Harman 2003], where universities implement joint educational and scientific programs, purchase expensive equipment for common use, but do not become a united organization. In Russia, such cooperation between universities is rare. More often than in most cases universities move from being independent organizations towards the formation of a single university.

Thirdly, the process of merging, from the initial decision on reorganization to the launch of the first joint training programs, is usually designed for an extremely short period and is not always accompanied by comprehensive studies on the need for reform and discussions on the matter.

Finally, students in Russian universities, both individually and within the student councils and parliaments, rarely take part in conversations about the current merger of universities or the selection of a new name and mission, and also seldom get to know their future colleagues and fellow students from a partner institution. As a rule, students are informed about the reorganization only after the decision is made, while the researchers of the mergers note that "Wherever possible, appropriate guarantees should be given to both staff and students. Of utmost importance is the need to generate staff, student and community support for proposed mergers. This will involve sharing merger plans widely, articulating goals and rationales, and promptly addressing rumours and errors of fact" [Harman, Harman 2003. P. 41].

2. University mergers: What changes

In the research and analytical literature devoted to amalgamations and takeovers of universities, the main changes occurring in educational organizations in connection with university mergers have been revealed.

1. Level/specialty: due to the unification, the level or sector of the educational system may change for educational organizations. This can be seen in the transformation of specialty colleges and insti-

tutes into universities by merging several educational organizations or joining them to major higher education institutions [Harman 1991; Kyvik, Stensaker 2013; Zhao, Guo 2002].

2. Mission, status, title: when reorganization is an instrument for creating a unified super—university, the mission, status and, in some cases, the name of the university are changed. For instance, it gains the status of a "world-class university", a "flagship university", a "federal university", a "campus of excellence" and so on [Aula, Tienari 2011; Delgado, León 2015; Geschwind, Melin, Wedlin 2015; Romanenko, Lisyutkin 2017]. If the university is joined with another institution, its name and other identity elements change and it acquires the host university status.
3. Organizational structure: a new organizational structure is developed by university mergers and a federal or unitary form of a united university can be chosen here [Harman, Meek 2002]. In the first case, the joined higher educational institutions become structural elements (faculties, schools and departments) of the united university in their former structure and with their former administration office. In the second case a completely new structure is created, the duplicate departments merge and a consolidated management appears.
4. Educational programs: through the cooperation of united universities new higher-level educational programs are created [Harman, Harman 2003; Kyvik, Stensaker 2013] and/or there is a replacement of the curriculum of the attached university with the host institution's programs.
5. Communication and mobility: in the case of merging geographically separated campuses, a new system of communication and mobility is created [Norgerd, Skodvin 2002; Ursin et al. 2010].
6. Funding: funding and material resources are redistributed within the united university, and in some cases higher educational institutions receive additional government funding for reorganization [Andreescu et al. 2015].
7. Organizational culture: the task after reorganization is to create a new culture and a common history of the united university [Aula, Tienari 2011; Harman 2002], new traditions and symbols [Välimaa 1998]. At the same time, there is often a clash of organizational cultures of universities in the process of the merger. A clash might occur between universities associated with academic direction and universities focused on research activity or on professional environment [Mathisen, Pinheiro 2016].

3. Research design: Theoretical framework, data and methods

The students' perceptions of the changes during university mergers are the focus of this study. The universities mergers are considered in the framework of radical organizational change [Greenwood, Hinings 1996] according to which "Radical change creates uncertainty and

demand for understanding of social relations in the implicit or informal side of the organization" [Pavlyutkin 2014. P. 2]. In particular, this concept examines how the participants of reorganizations interpret the changes under external pressure and how this interpretation affects organizational behaviour.

There are different groups operating in the organization, they are not neutral in relationship to each other and have fundamentally different interests Moreover, some groups are more outspoken and enjoy more privilege than others. Each group can win or lose due to changes during and after the university merger. Our task is to find out what changes are critical for students. Students are not always taken into account as one of the typical groups whose interests affect the process of a university merger. Such a situation may occur due to the lack of consensus about the place of students in the university and in this regard there is a serious theoretical discussion: if they are the object or subject of university education and management [Klemenčič 2014; 2016], external customers—"clients" [Gumport, 2000] or internal stakeholders [Leišytė, Westerheijden 2015]. In the conclusions the most evident changes for the students are compared with the key changes in the higher educational institutions, which are the results of merging processes, as described by research and analytical literature. Thus, we show how major university reorganizations are interpreted in the perception of students who study in universities during a merger process.

A qualitative research strategy was chosen to assess the subjective significance and visibility of certain changes for students via individual semi-structured interviews and focus groups. In order to represent the potential diversity of students' reactions in universities during the merger process, the four actual cases of university mergers that differ in the type of association (merging with the establishment of a new unified university with a new name and a new mission or joining of one university as a structural unit with another), geographical location and academic profile are displayed. Table 1 depicts a brief description of those cases. For ethical reasons, the real names of the universities—participants in the merger process, are not disclosed. Characteristics of mergers are introduced based on the classification of typical mergers and alliances, developed by D. Andréescu et al. [Andreescu et al. 2015] and complemented by information on the status of higher educational institutions relative to each other, taken from the Monitoring of the Quality of Enrollment to Universities in 2014–2016.[1]

[1] The Monitoring of the Quality of Enrollment to Universities was held by a working group of the National Research University Higher School of Economics in cooperation with the "Social Navigator" project conducted by International News Agency "Rossiya Segodnya" supported by Ministry of Education and Science of Russia and the Public Chamber of Russia. https://ege.hse.ru.

Table 1. **The main cases of university mergers**

Case	Code number	Specification
1	C1	The merger of a mid-ranking humanitarian university with a wide network of affiliates into a large and well-known mid-ranking pedagogical university
2	C2	The merger of several small mid-ranking universities majoring in economics and management into a large and well-known high-ranking university, also focused on education in the field of economics and management
3	C3	The merger of several mid-ranking and low-ranking engineering universities (including universities with the network of affiliates) and the establishment of a large united engineering university with a new name and a new mission
4	C4	The merger of two mid-ranking universities, classical and engineering, and the establishment of a new united university within the framework of the "Flagship Universities" program

The strategy of “convenience sampling” was used to select respondents for cases 1 and 4. The “snowball” strategy was used for cases 2 and 3. As a result, about 80 students aged 19 to 25 took part in interviews and focus groups. There were men and women, enrolled in different levels of study (undergraduate and graduate) and in different programs: linguistics, sociology, history, psychology, pedagogy, biology, mathematics, natural sciences, economics, civil law, engineering, design, etc. Among the respondents there also were students from different universities in each of the cases who were participants of the merger process as all of them were already studying at the university by the time of the launch of the merger process, i. e., they experienced the organizational changes first hand. Students who entered the united university were excluded from the study. The experience of those graduates who finished university before the reorganization process was launched deserves a specific study. Several interviews with teachers and the administrative staff of the universities participating in the merger process were arranged in order to characterize the context of each of the cases. The analysis of official documents regulating the reorganization was also conducted.

The questions for the interviews and focus groups were formed into three thematic clusters: a) the merger process and opinions about it; b) the attitude towards your university and partner university (universities); c) individual and group advantages and disadvantages of the union, as seen by students. The interview guides deliberately did not specify any direct questions about important changes for students in order to avoid expected and rehearsed answers. Subjectively important changes were identified during the analysis of transcribed

Table 2. **Changes during merger, subjectively visible and subjectively important for students**

"Formal" changes	Organizational characteristics: scholarships, dormitories, internships and practical training periods, formal communications within the university
	Characteristics of the educational process: requirements for examinations, term papers and thesis; teachers; educational track, curricula and official qualification specified in the diploma
"Informal" changes	University culture: traditions, "atmosphere", informal communications within the university
	Brand, status and reputation of the university and its diploma

interviews. The main groups of the most visible and significant changes for students, which were the result of university mergers, were identified during the coding process [Cohen, Manion, Morrison 2013].

4. Results: What changes for students during the merger

The Table 2 depicts the two most significant and sensitive changes for students, which are grouped according to thematic blocks. "Formal" and "informal" changes were determined based on the answers of informants. The changes, which exist and are noticeable to everyone according to students, were considered as formal. The changes, which are "subjective", immeasurable, and related to the emotional sphere of change, were considered as informal ones.

4.1. Key changes: Organizational characteristics

Financial means, university infrastructure, organization of living arrangements and time spent in relation to this issue are some of the main and often the first topics mentioned by students.

> "We have already changed the building for the third time. Now we are studying in the building *of another university* (the names of the universities have been italicized.— *K.R.*). And it wasn't only our program that it happened to. <...> To tell the truth, I am already tired: it is not clear where the apartment should be rented" (a girl, 21 y. o., C1).

> "There are advantages and disadvantages. Our fee based program students continued to pay the same amount under the contract, but the housing contracts were modified, and some students have lost their student housing guaranteed until graduation" (a boy, 23 y. o., C2).

> "Infrastructure suffered: almost all food stalls were closed, and the classes in *another university* equipped with the supplies we need are scarce" (a boy, 20 y. o., C2).

The issue of study conditions—remoteness of the university, living expenses, etc.—becomes the key topic when the reorganization of universities in addition to the merger also provides for the liquidation of a network of affiliates. In such cases, the university undergoing the change seriously alters not only the educational process, but also the entire way of life for students.

> "When I was in my second year, there were rumors that the university will be closed. In the third year we became *another university*. It turns out I will actually graduate from the third university. We were upset, because there was no enrollment after us, so they could have taught us in the city, and then do what they want. <…> Now we have to be travelling to and from Moscow every day, we spend five hours a day commuting. Rooms in the dormitory are not being assigned to those living in our city" (a girl, 23 y. o., C3).

> "I did not want to study anywhere else except for my city so I applied to the affiliate. Whereas previously I left the house and there was the university just around the corner, and the family was here. Now I have to move to Moscow to graduate" (a girl, 19 y. o., C1).

The organizational structure of higher education institutions changes during mergers and organizational processes are changed. Radical changes cause a sense of uncertainty among the participants of university mergers. If they do not receive complete information on the process of the reorganization, any changes in the educational process and related problems are perceived in an acute way and given further connotations. For example, notions of discrimination of certain members of the merger arise and, as a result, rumours of conflict between the merging universities appear.

> "I started my school year in yet *another university*, but they told me: you did not fulfill your program requirements, and they threatened to expel me. Then it turned out that documents about the makeup exams were lost during relocation in summer. <…> Well, they were found later. But everything was done so reluctantly and these employees from *another university* talked to me in that way! If I'm not from their university initially, it means I'm a second-class citizen, whatever" (a boy, 21y. o., C1).

In terms of the advantages provided by university mergers, the development of educational opportunities for students and even the reduction in competition for university resources in a given region are often considered [Kyvik, Stensaker 2013. P. 327]. However, for students, the merger may have the effect of an increase in perceived competition for material opportunities and career prospects.

> "Next year I should have an internship in Spain from the faculty. But the amount of students has increased. So what? Does it mean I have to go through the selection process again because of more competitors?" (a girl, 22 y. o., C4).

4.2. Key changes: The characteristics of the educational process

Students mentioned first of all the replacement of the teaching staff and the increase in the number of fellow students among the changes occurred in connection with the reorganization of educational process. Both issues can be perceived as a positive as well as a negative outcome.

> "At my faculty there was not a single previous teacher. I think it's good that the teaching staff has changed. It is believed that in *another university* they are more qualified" (a boy, 23 y. o., C3).

> "The only group of marketers I studied in became a part of a large marketing department where it is the 8th. <…> All educational processes have changed up to the curriculum, which suffered the most" (a boy, 20 y. o., C2).

"Changing the rules of the game" regarding the examination process, the content of course projects and the process of thesis presentation is another fundamental change for students. Moreover, these changes can be interpreted both as a fair strengthening of the requirements for students because of their incorporation in a stronger or more prestigious university and as discrimination of students from one university by teachers from another.

> "Most of the concerns were caused by the commission on the State examinations and the thesis presentations. Guys who are used to preferential treatment <…> well, even if you do not answer anything, you get three (troika), really stepped up" (a girl, 24 y. o., C3).

> "Our girl, who was supposed to get honors degree, was simply made to fail her exam. In my opinion, it was completely undeserved. When she went to talk to the dean of the faculty, his reaction was, you know, to scratch his stomach, sympathetically tap on her shoulder and wish her good luck in the future" (a girl, 23 y. o., C2).

The modifications in official educational track and field of study indicated in the diploma were significant as "formal" ones for students. Almost all mergers are accompanied by such transformations, since the task is to eliminate duplicate departments in two or more organizations, which is common in such situations. In some cases departments that are similar in function or academic focus preserve the autonomy and even compete with each other at united universities [Osipov, Ivanov 2004, p. 167; Finance, Coilland, Mutzenhardt 2015]. In other cas-

es they are merged into one department. Some of the amalgamations seriously affect the interests from the students' point of view.

> "Our program—tourism—has shifted to the geographical faculty. <…> Well, probably, because it is about travel… <…> I am personally insulted. It will not be properly specified in the diploma that I am a tourism analyst because I will be someone like a geography teacher" (a girl, 20 y. o., C1).

So the reputation of teachers, the specificity of the curriculum, the number of fellow students, the strengthening of the requirements for students, the educational track and the field of study written in the diploma are significant for students as characteristics of the educational process, changing during a university reorganizational process. At the same time, participants did not mention any developments in the content of the educational process or the knowledge and skills obtained during the study as being critically important for them.

4.3. Key changes: University culture

The need for the creation of a unified university culture after a merger or takeover is regularly specified in the analysis of mergers as a key task. A clash of representatives from different university cultures in the united university is one of the most frequent problems. In our study, students also consider incorporation into a new university culture as a negative experience and share difficulties in communication with students and employees from a partner university who are from a different culture and "atmosphere". Participants experience the consequences of university culture collisions in following situations:

a) the shift from a small university where personal contacts matter to a large university where interactions are caused by bureaucratic procedures;
b) the shift from universities with a focus on vocational education to a university where research is a priority;
c) the forced interaction between students from universities with a different academic orientation ("technicians" and "humanitarians", "normal historians / linguists" and "educators"—in terms of informants).
d) the forced change in customs, holidays, and ways to actualize the shared history and identity of the university.

> "I definitely like it that I can see far more people in the university than before. I take part in events more. But due to the size there is lots of bureaucracy and a huge distance between students and teachers. What did our university boast about? Its internal atmosphere. There is no such a thing here. <…> There is also a very arrogant attitude from the dean's office; a very high degree of formalization. If you forget your pass, you should go to the checkpoint, where, of

course, there is a queue. So you have to call your chair, let you write out a temporary pass and go down to the checkpoint, and only after this you can go through. <…> I cannot say that such a culture has a positive impact on study, not really" (a boy, 21 y. o., C2).

"Of course, there is a difference between us. Our teachers are still scientists and researchers <…> Well, we have prominent psychologists, for example. This gives some kind of breadth of mind, some completely different communication culture in the university" (a girl, 20 y. o., C1).

"We have strong artistic traditions. We constantly make holidays, performances, and concerts. For example we have the "Theater Spring", everyone participates in it, and our teachers encourage it. They have nothing like this, they just study. <…> It's scary when our reliance on creativity will be shortened because of the merger" (a girl, 18 y. o., C4).

4.4. Key changes: Status/reputation of the university

The issue of the brand, status and reputation of the university and its diploma, as well as the changes in connection with the reorganization, was at the top of the priority list for students, regardless of their positive or negative opinion towards events taking place at the university. At the same time, respondents did not mention official international and Russian university rankings. The status of the university and possibility to belong to its potential graduate were determined based on the opinions of relatives, acquaintances, the media and abstract "public opinion".

"After the merger, our university simply turned into nothing—without its normal name, without its history. <…> Previously everyone in the region knew what I talked about: it was my faculty, it was my university. And now it is unclear where I studied and what I graduated with" (a boy, 20 y. o., C4).

The reactions to organizational changes among students from different universities—members of the merger process—are asymmetric. In the case of the subjective and objective inequality of partner universities, students of weaker universities describe themselves as winners: they have the opportunity to become graduates of a higher status and more famous university. They quickly begin to identify themselves with the united university.

"I see more advantages than disadvantages of the merger, but my opinion is biased, because I dreamt to enroll at *another university*. At the time I did not enroll in it, but it turned out to be here now. <…> So I'm glad that I will have a diploma of university I wanted to enroll at" (a girl, 21 y. o., C3).

On the contrary, the students of the university considered to have more status and popularity before the merger, describe the situation regarding organizational changes as unfair and depreciating their diploma and their status as future graduates of their university.

> "Really it is disappointing that it turns out our diploma does not mean anything. We made efforts to do something while others were just transferred to us. <…> How will employers find out whether I'm a normal graduate or from this merged university?" (a girl, 23 y. o., C1).

5. Conclusions

Data on key changes during university mergers and takeovers described in the research and analytical literature together with the results of this survey allow for identifying the students' perception of these events (Table 3). For example, only local revisions in terms of organizational structure and funding system affect the daily study routine, while such transformations are usually the main focus of attention of those who enforce and analyze university mergers. On the contrary, a new organizational culture, i. e. interaction of staff, teachers and students from different universities and the task of creation a common organizational culture of a unified university, is visible and important at each level and for all university groups.

Students do not mention the content of education by itself as a characteristic of the learning process, but it becomes significant for them after its modifications during the reorganizational process. It occurs despite the widespread rhetoric about university mergers as a way to provide students with access to strengthened and diverse curriculum and generally to expand their educational opportunities. Students associate research activities at the university with teachers, but not with their own curriculum. Research is mentioned as one of the elements of the common university culture, but not as an opportunity for study or internship.

The issues of prestige, status and level of the educational institution, its teachers and its diplomas, are the most significant ones for students. Students as stakeholders within the university evaluate the most important organizational changes for them and strive to take maximum advantages for themselves "… to seek to translate their interests into favorable allocations of scarce and valued organizational resources" [Greenwood, Hinings, 1996. P. 1033]. The most valuable assets for them are not knowledge obtained during the study within educational programs, but the material conditions and the status of the diploma described, incidentally, not through official ratings, but through public opinion and the opinion of potential employers.

Thus the results of the study complement the available data on the transformation of higher education institutions during their mergers and make it possible to take into account students' opinions when de-

Table 3. **Key changes during university mergers**

University mergers: what changes	University mergers: what is significant for students
Level/specialty of education system	Brand, status and reputation of the university and its diploma University culture: traditions, "atmosphere", informal communications within the university Characteristics of the educational process: requirements for examinations, term papers and thesis; teachers; educational track, curricula and official qualifications specified in the diplomas
Mission, status, title	Brand, status and reputation of the university and its diplomas
Organizational structure	Organizational characteristics: scholarships, dormitories, internships and practical training periods, formal communications within the university
Educational programs	Characteristics of the educational process: requirements for examinations, term papers and thesis; teachers; educational track, curricula and official qualifications specified in the diplomas
Communication and mobility	Organizational characteristics: scholarships, dormitories, internships and practical training periods, formal communications within the university
Funding	Organizational characteristics: scholarships, dormitories, internships and practical training periods, formal communications within the university
Organizational culture	University culture: traditions, "atmosphere", informal communications within the university

signing such mergers. These results can be interpreted more broadly: analysis of students' reactions during the period of critical changes contributes to the tradition of research and discussion concerning the place of students in the modern local university.

Based on the results of the study the following issues seem to be forward-looking: the elaboration of ways to inform students about the university reorganization and their involvement in the management process, for example, during the development of a new strategy for a unified university; the analysis of university culture as an index of quality of life in university, which experiences challenges during organizational changes; and the research of student identity as a characteristic more or less associated with features of a particular university.

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The Demand for Massive Open Online Courses (MOOC): Evidence from Russian Education

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Abstract. The paper examines the popularity of massive open online courses (MOOCs) in Russian universities, motivation to learn in such courses, and the attitudes of students and faculty towards the possible substitution of MOOCs for traditional courses. Results of a survey carried out within the framework of the Monitoring of Education Markets and Organizations Project are used to identify the factors of demand for MOOCs among students and faculty of Russian universities. Findings show that the likelihood of learning in MOOCs or planning to do so is higher among active and high-performing students and faculty involved in research activities and upgrading their skills in summer schools. Studying in a top university has a strong positive impact on the probability of student participation in MOOCs. However, the same effect for university faculty is ambiguous.

Keywords: MOOC, distance learning, e-learning, online education, massive open online courses, demand for education.

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Massive open online courses, or MOOCs, are a type of free online course. They came into wide use in 2008, when the term as such was coined [Bugaychuk 2013]. The two key characteristics of MOOCs are openness and massiveness, the latter implying unlimited participation [Li, Powell 2013]. MOOCs provide for interactive communication between learners and teachers as well as online testing opportunities. After signing up for a course, learners get access to educational materials, interactive communication with the teacher, and tests. Course

Translated from Russian by I. Zhuchkova.

participants are supposed to watch video lectures, read online materials, and complete tasks and tests on every topic by a fixed date. Test results are assessed in credit points, and learners who earn a specified number of credit points obtain a certificate of successful course completion.

MOOCs are integrated into existing platforms that provide technical support and free access to educational materials, enable teacher-student communication, student performance evaluation, etc. According to the latest data, the proportion of online learning in the global education market hovers around 3 percent, which is $165 bln [Netology Group 2017[1]]. The most popular platforms include Coursera, edX, and Udacity. Coursera, 2017's market leader, was founded in spring 2012. By the fall of 2017, it reported having 27 mln learners, 150 university partners, over 2,000 courses in hundreds of specializations, four types of certificate, and four Master's degree programs[2]. In 2016, the company's revenue was estimated at $50–80 mln [Ibid.]. The first Russian universities to cooperate with Coursera in 2013 were the Moscow Institute of Physics and Technology (MIPT), the National Research University Higher School of Economics (HSE), and Saint Petersburg State University.

The Russian market of online learning burgeoned in 2013. As early as 2014, according to J'son & Partners Consulting, it had a few million learners and over 50 course providers[3]. The size of the market was estimated to be 20.7 mln rubles at the end of 2016, accounting for 1.1 percent of all educational services; the market of all distance learning programs in higher education was estimated at 6.8 mln rubles, the proportion of online courses being 1.8 percent [Ibid.].

The arrival of MOOCs is changing the situation in modern education dramatically, increasing accessibility of education [Li, Powell 2013], upgrading the structure of universities, and shaping positive externalities for them [Bugaychuk 2013]. At the same time, some authors wonder if MOOCs could present a potential threat to present-day universities [Foerster 2017]. Given the situation, it is crucial to understand how demand for MOOCs is created in Russia, primarily among university students and faculty. Research has been conducted to examine sociodemographic characteristics of MOOC learners and factors of successful course completion. However, only few studies analyze the component of demand for MOOCs, while the Russian research database features no such studies at all. This article investigates the factors of demand for MOOCs among university students

[1] http://edumarket.digital

[2] https://ru.coursera.org/

[3] http://json.tv/ict_telecom_analytics_view/rynok-onlayn-obrazovaniya-v-rossii-i-mire-segment-massovyh-onlayn-kursov-20141209065340

and faculty in Russia, focusing on differences between universities of various types.

1. Theoretical and Empirical Research on MOOCs

1.1. MOOC Influence on Education

A number of studies have been dedicated to what a MOOC is and how MOOCs have developed, e. g. [Bugaychuk 2013; Li, Powell 2013; Stewart 2013]. Li Yuan and Stephen Powell [Li, Powell 2013] have found that the implications of MOOCs for education in general and university development in particular may be analyzed in the context of Clayton M. Christensen's "disruptive innovations" [Christensen, Raynor 2013]. Disruptive innovations give rise to new markets by introducing a new need or demand among existing consumers or creating a product for a new audience, which is exactly what MOOCs do in education. Can such courses disrupt the conventional education system or jeopardize modern universities [Foerster 2017]? Based on what is known today, it is cooperation rather than competition that is observed between the two systems: top universities engage in delivering MOOCs, thus increasing their visibility and the accessibility of their degrees. They often treat online courses as a testing ground and integrate them into their programs, for example assigning them as homework [Li, Powell 2013]. MOOCs do not profess to replace traditional universities, as they do not offer full-fledged degree programs, issue diplomas of higher education, or award university-specific degrees. The great majority of MOOC learners do not seek to obtain a certificate; many simply watch videos or read texts, and some take tests, demonstrating how diverse educational strategies can be [Ho et al. 2014].

1.2. Advantages and Disadvantages as Compared to Traditional Classrooms

MOOCs' key advantage is that they make education more accessible due to their openness, massiveness, distance learning opportunities, and possibility of choosing between courses and levels of difficulty. MOOCs designed by the world's best universities offer high quality content, flexible class schedules, and groundbreaking teaching methods [Krukier, Muratova, Saltykova 2014]. MOOCs let universities experiment with online courses and teaching practices, adopt new educational technologies, as well as attract broad public attention to their degrees and promote their brands. Businesses are interested in entering the education market, too [Li, Powell 2013]. Finally, politicians may see in MOOCs opportunities for enhancing access to education and bringing down the education costs for students and governments.

However, MOOCs also have a number of limitations and weak points. For example, many universities still do not award credits for MOOCs; besides, the positive role of MOOCs in the development of new teaching methods is not evident to all researchers [Ibid.]. There are no formal guarantees, so the quality of learning becomes heavily dependent on learners' self-regulation. In addition, learners often receive their certificates from the platform, not from the university that

designed the course [Bugaychuk 2013], although this limitation has been addressed recently, and universities are now taking the responsibility for certifying the competencies achieved on national open education platforms.

Assessment can also be a challenge: MOOCs use tests extensively, which allow for evaluating a number of students but cannot be applied to any course. Where essay-type assessment methods are used, the massive learning model makes it impossible for an instructor to evaluate everyone, so peer assessment is used. MOOC assessments have to deal with limited opportunities for practical work, difficulties of assessing competencies in humanities courses, irregular feedback, and test taker identification issues [Bugaychuk 2013]. A good many researchers have observed high dropout rates and low engagement of most MOOC learners [Ho et al. 2014; Krukier, Muratova, Saltykova 2014].

1.3. Motivation to Learn in MOOCs

The following motivations for online learning have been observed in MOOC participants: fun and enjoyment; interest in the topic; relevance of subject to academic field of study; obtaining new in-depth knowledge in subject; trying online education; curiosity, entertainment; eager to explore a new topic; personal challenge; getting a credential; career advancement, opportunity for professional growth; resume enhancement; free access; interest in the field of study; substitute for an offline course which is inaccessible; interest in how these courses are taught; extending current knowledge of the topic; professional conversion / changing a major; obtaining knowledge to improve academic performance; new acquaintances and friends [Belanger, Thornton 2013; Hew, Cheung 2014; Kizilcec, Piech, Schneider 2013; Breslow et al. 2013; Shapiro et al. 2017]. “Non-pragmatic” motives like curiosity, enjoyment from learning, etc. tend to prevail over practical ones, such as career advancement, professional conversion / changing a major, getting a credential, etc.

1.4. Factors of Demand for MOOCs and Learner Success

Studies of MOOC learners’ demographics conducted by University of Pennsylvania [Christensen et al. 2013], Harvard and MIT [Ho et al. 2014], and the University of London [Grainger 2013] show that the majority of MOOC learners are university-educated males, except for courses in humanities. Researchers ask themselves more and more often, why only a small fraction of learners complete courses successfully, what affects the chances of course completion, and how MOOC learners distribute their time and efforts among different components of learning [Liang et al. 2014; Alraimi, Zo, Ciganek 2015; Phan, McNeil, Robin 2016]. So far, factors of demand for MOOCs have been largely overlooked. It has been found, for instance, that the demand for online courses is extremely low among Chinese teachers [Johnston 2016]. By contrast with the OECD countries, where demand for MOOCs varies depending on the level of educational attainment, in

China it is contingent on Internet access and income level [Tong, Li 2017]. Meanwhile, university students found performance and effort expectancy to be significant factors of demand for MOOCs rather than demographic or social determinants [Deng 2017].

2. Research Method

This study aims to identify the factors of demand for MOOCs among students and faculty of Russian universities. It also describes intentions of MOOC learners, their opinions about the pros and cons of such education, and their attitudes toward integrating online courses in universities. The basic hypothesis of this study is that demand for MOOCs is affected by the type of university, in particular that it will be higher in universities with better education quality.

The empirical basis of the research represents student and faculty survey data obtained as part of the Monitoring of Education Markets and Organizations (MEMO)[4] conducted in fall 2016. A special set of items on MOOCs was introduced in that wave of the survey. Interviews were conducted in 101 universities (including 94 public and seven private, among them two federal universities and six national research universities) from different regions of Russia, selected as a result of two-stage stratified sampling. At the first stage, universities were selected by the criterion of region and form of incorporation, and then students and faculty members from different departments were selected in every university. Supervised self-completion questionnaires were used. About 13 percent of all contact attempts resulted in refusal from participation, explained by the lack of time. Quality was controlled at both the interviewing stage and the data cleansing one. The final sample included questionnaires completed by 3,396 students and 1,559 teachers. Weighted data is used further on to ensure that the results are representative across the federal districts of Russia. Comparison with Rosstat[5] statistics shows that the sample is largely consistent with the demographics of university students and faculty[6].

Types of university as a factor of demand for MOOCs were determined using the ranking based on HSE's Monitoring the Quality of Enrollment in Russian Universities[7]. To assess the quality of enrollment, the ranking uses average USE[8] scores of the students enrolled. Because the ranking leaves out private and liberal arts universities as well as some public ones, we also used the average admission USE scores provided by Russian Education, a national portal of Russia[9]. As

[4] https://memo.hse.ru/

[5] Russian Federal State Statistics Service

[6] For more on data collection methods, see [Rudakov, Roshchina 2018].

[7] https://www.hse.ru/ege/about

[8] Unified State Examination

[9] http://www.edu.ru/ratings/srednie-prohodnye-bally-ege-v-vuzy-2016/

a result, all the universities from the MEMO sample were divided into four categories:

(1) (i) universities with high enrollment quality (public non-liberal-arts universities with average admission USE scores of 70 and more; 31 universities of the MEMO sample)[10];
(2) (ii) universities with average and low enrollment quality (public non-liberal-arts universities with average admission USE scores below 70; 52 universities of the MEMO sample)[11];
(3) (iii) liberal arts universities (10 of the MEMO sample);
(4) (iv) private universities (7 of the MEMO sample).

3. Findings: Demand for MOOCs among University Students and Faculty in Russia

3.1. Awareness of MOOCs and MOOC Experience

Among university teachers asked, "How do you feel about allowing students to choose massive open online courses over some of the conventional lecture courses delivered in your educational institution?" in 2015, only 7 percent of respondents admitted knowing nothing about MOOCs. In 2016, when asked about their MOOC experience, 41 percent of teachers reported having no idea what a MOOC is, while 25 percent said they had heard of MOOCs but had never taken any interest in them (Table 1). The 2016 findings seem to describe faculty awareness of MOOCs better. The proportion of instructors totally unaware of MOOCs is the highest in private universities and the lowest in top ones.

According to a 2016 survey, 23 percent of the faculty reported knowing about MOOCs and having taken interest in them (visited websites, looked through courses, etc.) but having never tried them, and only 11 percent reported having participated in MOOCs, with slightly over half of them having never obtained any certificate. The proportion of MOOC participants among faculty in top universities was 15 percent, 8 percent of whom had obtained a relevant certificate. Private university teachers are running second in this indicator (11 percent have tried MOOCs, and 7.5 percent have obtained a MOOC certificate), whereas only one in ten faculty members of regular public universities has participated in MOOCs. The percentage is the lowest in medical and engineering universities. Eight percent of instructors reported using MOOC materials to prepare for their own offline courses.

Nearly three in every four students of Russian universities have never heard of MOOCs. Only 26 percent of the respondents know about their existence, 15 percent have heard of them but have never taken interest in them, and eight percent have shown interest but never tried any MOOC. Only 2.3 percent of the students have tried learning in MOOCs, and only 1 percent of them have obtained a certificate. Thus, the integration of MOOCs in the learning process of Russian uni-

[10] "Top universities" from this point on

[11] "Regular universities" from this point on

Table 1. **Participation of students and salaried faculty members in MOOCs** (2016, weighted data,% by the type of university)

	Top universities	Regular universities	Liberal arts universities	Private universities	Total
Faculty					
Know nothing about MOOCs	34.7	41.4	41.3	56.4	40.8
Know about MOOCs but have never taken interest or part in them	27.0	24.6	30.7	12.0	24.8
Know about MOOCs, have shown interest in them (visited websites, looked through courses, etc.), but have never taken any MOOC	23.8	24.3	18.7	20.3	23.2
Have tried MOOCs but have never obtained any certificate of completion	6.3	4.4	6.0	3.8	5.1
Have tried MOOCs and obtained at least one certificate of completion	8.2	5.3	3.3	7.5	6.1
Students					
Know nothing about MOOCs	67.9	75.8	76.8	75.9	73.6
Know about MOOCs but have never taken interest or part in them	16.3	13.9	15.3	13.3	14.7
Know about MOOCs, have shown interest in them (visited websites, looked through courses, etc.), but have never taken any MOOC	10.3	7.8	6.2	8.9	8.4
Have tried MOOCs but have never obtained any certificate of completion	3.8	1.7	1.5	1.3	2.3
Have tried MOOCs and obtained at least one certificate of completion	1.6	0.9	0.3	0.6	1.0

versities has to be recognized as very insignificant. At the same time, some optimism is inspired by the fact that students of top universities know more about MOOCs and use them more actively than students from universities of other types. In particular, 68 percent of students in top universities know nothing about MOOCs, as compared to 76 percent in regular universities; 10 percent have taken interest in MOOCs, as compared to 8 percent in regular universities; 4 percent have participated in MOOCs, as compared to 2 percent in regular universities; and 2 percent have obtained a MOOC certificate, as compared to 1 percent in regular universities. Further on, this article will only refer to faculty and students who have at least heard something of MOOCs.

3.2. Attitudes toward Integrating MOOCs in Universities

The same question was asked to faculty members in 2016 and 2015: "How do you feel about allowing students to choose massive open online courses over some of the conventional lecture courses delivered

in your educational institution?" However, in 2016 the question was only asked to those who had reported at least having heard something of MOOCs in the previous year, while the 2015 response options included "Have never heard of MOOCs". This option was chosen by 7 percent of teachers in 2015. However, the proportion of unaware instructors was found to be 41 percent in 2016, so allowance must be made for these base-level differences when comparing respondents' answers in 2015 and 2016.

Among faculty members aware of MOOCs, 38 percent of respondents in general fields of study felt "rather positive" about such a possibility, and 31 percent were neutral in 2015. In 2016, the respective indicators were 27 and 34 percent, i. e. the balance of attitudes swung from positive to neutral. Meanwhile, teachers in specialized fields of study showed even less approval: the proportion of respondents with a positive attitude dropped from 29 percent in 2015 to 17 percent in 2016, while neutral responses decreased from 25 to 22 percent.

A positive attitude towards online courses is observed most often among teachers of private universities (34 percent in general fields of study and 40 in specialized ones), although it would seem that they should be competing with MOOCs. Only 18 percent of faculty in general fields of study and six percent in specialized ones supported the online learning initiative in liberal arts universities, which comes as no surprise, given the great role of tutorship, practical work, and personal teacher engagement in universities of this type. Differences in the level of approval between top and regular universities are quite expected, yet insignificant: 28 percent of teachers in general fields of study and 19 percent of those in specialized fields feel positive about integrating online courses in top universities, as compared to 27 and 15 percent in regular universities, respectively.

In terms of university specialization, support for MOOCs in general fields of study is the highest in humanities universities (42%) as well as medical, teacher training, economic, legal, and agricultural universities (about 30% for each type). Use of MOOCs in specialized fields of study is considered possible by 37 percent of teachers in humanities universities, 26 percent in economic, legal, and teacher training universities, and 20 percent in agricultural universities. Liberal arts universities and classical universities have been found to favor such courses less than any other category. Assumingly, the perception of MOOC integration and implementation prospects is contingent on teachers' evaluations of their potential benefits in education. Instructors in classical and liberal arts universities see their education programs as "irreplaceable" due to the unique value of a teacher's personality in creative majors or the high quality of teaching in classical universities. The question as to whether uniqueness of human resources imposes grave limitations on using MOOCs or if this is only a trap of "academic snobbery", remains open.

Students were not asked about their attitude towards introducing MOOCs instead of some offline courses in 2015. In 2016, only 7.5 percent of students spoke strongly against integrating MOOCs into general fields of study, and 13 percent, into specialized fields of study. Students are more likely to agree to the substitution of MOOCs for traditional courses in general fields of study (43 percent feel "positive" or "rather positive" about it) than in specialized ones, where only 34.5 percent reported feeling "positive" or "rather positive".

3.3. MOOC Advantages

Among the main advantages of massive open online courses, university teachers named first of all greater access to education (59%). Other advantages identified include self-paced learning (30%), professional growth opportunities (31%), use of advanced teaching strategies/methods (including those that are interactive and increase motivation for learning (22%), more relevant course content and opportunity for all-round general development (19–20%), and the diverse choice of courses available.

Curiously, teachers of private universities tend to value the "opportunity for improving academic attainment of students as a result of such education" much more than their colleagues (22%), which is also true for the "opportunity for all-round general development" (24%, similar to teachers in liberal arts universities). Respondents from liberal arts universities were found to attach more importance to the "diverse choice of courses available" (25%) than teachers from universities of other types. Faculty in regular public universities tend to value "professional growth opportunities" a lot (34%).

Students, in their turn, see the main advantages of MOOCs in greater access to education (53%), self-paced learning (36%), opportunity for all-round general development (31%), and professional growth opportunities (28%). Only 19 percent of students chose more relevant course content to be a MOOC advantage. The "opportunity to take a course in a foreign language" was selected by 9 percent of the respondents.

Certain differences in assessing MOOC advantages can be found among universities of different types. For instance, teachers from private universities are much more likely to agree that MOOCs will improve student attainment (22.4%), while teachers from liberal arts and private universities tend relatively more often to appreciate the opportunity for all-round general development as a MOOC advantage, and liberal arts university teachers value MOOCs first of all for the diverse choice of courses available.

Students in top universities are relatively more likely to name greater access to education, opportunity for self-paced learning and all-round general development, professional growth opportunities, and opportunity to learn in a foreign language as the key MOOC advantages than their peers. Meanwhile, students from private univer-

sities are relatively more likely to focus on more relevant course content, communication, and peer support.

3.4. MOOC Disadvantages

Forty-five percent of the faculty see the main disadvantage of MOOCs in the lack of personal teacher-student contact and fewer individual learning opportunities. Other disadvantages named by the respondents include the impossibility to identify test takers (35%), low course completion rates (37%), education quality degradation (27%), and the need to pay for a verified certificate (20%).

Teachers from top universities (32%) and liberal arts universities (31%) focused on the risk of education quality degradation more often than their colleagues. Additional research is needed to find out whether this is a genuine risk assessment or an attempt to protect their "teacher benefits". The lack of personal teacher-student contact as a MOOC disadvantage was mentioned more often by faculty members from regular (47%) and liberal arts universities (45%), the need to pay for a verified certificate by respondents from private universities (32%), and the lack of strict performance assessment policies by instructors from liberal arts universities (21%). Teachers of liberal arts universities are also more likely to see taking courses in a foreign language as a disadvantage (32%). Respondents from private universities are concerned much less than their colleagues about test taker identification issues (18%). Their opinion is a particularly far cry from that of faculty in regular universities, 39 percent of whom would prefer to be sure about test takers' identities.

Students determined the main disadvantages of MOOCs to be low course completion rates (48%), the lack of personal teacher-student contact (41%), the impossibility to identify test takers (30%), and the need to pay for a verified certificate (22%). The risk of education quality degradation in MOOCs was mentioned by 18 percent of university students.

Differences across the types of universities have been observed. Teachers of top universities are relatively more likely to beware of education quality degradation and high dropout rates, while teachers of regular universities focus more on the impossibility to identify test takers. Instructors from private universities see it more often as a disadvantage that many courses are delivered in a foreign language, while respondents from regular and liberal arts universities are frustrated more by the lack of personal teacher-student contact.

Students of top universities see the key disadvantages of MOOCs in the low course completion rates and the lack of personal teacher-student contact. Students from private universities are relatively more likely to mention test taker identification issues and lower education quality.

3.5. Intentions to Learn in MOOCs

Among teachers who are aware of MOOCs, 26 percent are definitely going to take such courses in the future, 60 percent allow for such

Table 2. **MOOC Experience and Intentions Among Students and Salaried Faculty Members** (2016, weighted data,% of the sample, by university type)

	Top universities	Regular universities	Liberal arts universities	Private universities	Total
Faculty					
Never heard of MOOCs	35.0	41.6	41.7	56.4	41.0
No past experience, no intentions	8.8	7.3	11.9	3.8	7.9
No past experience, planning to participate	**41.8**	**41.4**	37.1	28.6	40.0
Past experience, no intentions	0.9	0.1	0	0	0.3
Past experience, planning to take more	13.5	9.6	9.3	11.3	10.9
Students					
Never heard of MOOCs	67.9	76.2	77.0	75.9	73.8
No past experience, no intentions	2.6	2.6	5.6	3.8	3.0
No past experience, planning to participate	**24.0**	18.7	15.9	18.4	19.9
Past experience, no intentions	0	0.2	0.6	0	0.1
Past experience, planning to take more	5.5	2.4	0.9	1.9	3.1

possibility, and 14 percent will definitely never use the opportunity. The proportion of prospective MOOC participants is the highest among instructors of private universities and the lowest in liberal arts universities. Among students who know about MOOCs, 17 percent will definitely take such courses in the future, 72 percent allow for such possibility, and 12 percent are definitely not going to participate. Just as among faculty, the proportion of prospective MOOC participants is the highest among students of top universities.

Table 2 brings together data on MOOC awareness, experience, and intentions (Table 2). Forty percent of the faculty have never tried but are going to take MOOCs with more or less probability; only 0.3 percent have some prior MOOC experience and do not want to take it any further, and 11 percent have already taken some MOOCs and intend to take more in the future. The highest proportion of prospective MOOC learners (over 40%) is observed among teachers of public non-liberal-arts universities regardless of the quality of enrollment, and the lowest has been manifested by private universities (29%).

Seventy-four percent of students have never heard of MOOCs, and three percent have heard of them but have never tried them and are not going to do so. Only 3.1 percent have some online learning experience, and almost every student with MOOC experience is going to take it further. One in five students has no MOOC experience but is going to use MOOCs in the future. The highest proportion of students

planning to take MOOCs is observed in top public universities (24%), and the lowest in liberal arts universities (16%).

From now on, we will only dwell on those respondents who have tried or are going to take MOOCs, which is 51 percent of all teachers and only 23 percent of the student sample. As judged by the faculty's answers, nearly two thirds have taken or will take courses in Russian only, and one third has tried or is willing to try courses in both Russian and foreign languages. Only 3.7 percent have taken or will take online courses in a foreign language exclusively. The proportion of Russian-adhering respondents is the highest in regular public and private universities.

Most students interested in MOOCs have tried or are going to take courses in both Russian and foreign languages (38%) or in Russian only (37%), while MOOCs in foreign languages exclusively attract 4.5 percent of students. Students willing to take courses in foreign languages are more numerous in top universities than in universities of other types.

Fifty-nine percent of the instructors have taken or intend to take courses related to their major or subject taught, six percent opt for courses outside their majors and subjects, and 27 percent have tried or are going to try both. The proportion of teachers choosing courses outside their major and subject is the highest in private universities (20%). Courses inside one's major or subject are most often selected in public universities: 58 percent in top universities and 62 percent in regular ones.

Most students are going to take (or have taken) MOOCs in their own or related major (46%), regarding them as complementary to their basic education, not as a tool for changing their major or gaining totally new knowledge. Students of top universities are more likely to take MOOCs in their own or related major, yet 27 percent of them ticked "related as well as new majors" (as compared to 39 percent in liberal arts universities), and 12 percent opted for majors outside their own (as compared to 19 percent in private universities).

3.6. Learning Objectives in MOOCs

Seventy-six percent of all faculty members who have tried or intend to take MOOCs see objectives of such learning in enhancing their professional skills in their major/subject, 42 percent in mastering new strategies and methods of teaching, 30 percent in general development, 29 percent in gaining online learning experience, and 12 percent in learning a new major (Table 3). Enhancement of professional skills in one's own major/subject was chosen more often in regular public universities (82%), learning a new major in private universities (21%), and general development in liberal arts universities (48%), along with gaining online learning experience (35%) and learning new teaching strategies (50%).

Forty-six percent of the students see the main objective of MOOCs in general development, while 41 percent believe that such education

Table 3. **Motivation for (Prospective) Learning in MOOCs among Students and Salaried Faculty Members** (2016, weighted data,% of (prospective) MOOC learners, by university type)

	Top universities	Regular universities	Liberal arts universities	Private universities	Total
Faculty					
Enhance professional skills in one's own major/subject	70.1	**81.7**	69.7	58.3	75.6
Learn a new major	12.4	10.8	6.6	**20.8**	11.7
General development	33.3	25.4	**48.4**	32.5	29.9
Gain online learning experience	30.1	30.3	**35.0**	11.5	29.4
Learn new teaching strategies, methods, etc.	35.5	**46.4**	**49.9**	28.6	41.7
Join the crowd	1.7	0.7	0	3.7	1.2
Students					
Get employed or get a specific job	27.7	25.2	5.3	**32.5**	24.9
Improve academic performance	**14.6**	8.8	6.2	2.6	10.6
Enhance professional skills in one's major	44.6	36.1	**54.1**	32.4	40.7
Learn a new major	**18.9**	**19.8**	12.1	17.2	18.8
General development	41.0	47.5	52.4	**57.0**	45.7
Join the crowd	1.9	2.9	5.6	**5.9**	2.8

can be pursued to enhance one's professional skills in their university major. Twenty-five percent hope that MOOCs can help them get a job, and only 11 percent associate learning in MOOCs with improving their academic attainment in university (Table 3). Enhancing one's professional skills in their major is a more important motivation for students in top universities than general development (45 and 41 percent, respectively). Quite probably, students in universities of other types approach higher education as a way of filling gaps in their high school education, whereas their peers from top universities attach more importance to professional growth on the basis of quality high school education.

3.7. Factors that Influence Engagement in MOOCs

Two multinomial logistic regressions were assessed to identify factors influencing engagement in MOOCs among faculty (Table 4) and students (Table 5), the dependent variable taking three values:

- never heard of MOOCs or not intending to use MOOCs" (basic category);
- never taken any MOOC but planning to do so"; and
- have some MOOC experience".

Table 4. **Estimated multinomial regression of factors influencing engagement in MOOCs among faculty members** (base: "never heard of MOOCs or not intending to use MOOCs"), N = 1,331

	Intentions		Past experience	
	RRR	sign	RRR	sign
Top university (base: regular university)	1.277	0.131	**1.557***	**0.084**
Liberal arts university	0.967	0.892	0.928	0.854
Private university	0.985	0.955	0.736	0.541
Moscow	1.031	0.839	**0.575****	**0.026**
Doctor of Sciences	1.439	0.156	1.152	0.751
Candidate of Sciences	**1.451****	**0.020**	**2.119*****	**0.004**
PhD	0.515	0.320	2.388	0.145
Teacher of (base: social sciences)				
— foreign language	**2.125***	**0.066**	**3.812****	**0.016**
— humanities	1.112	0.598	1.388	0.297
— mathematics, programming	**1.571****	**0.046**	**2.557*****	**0.003**
— natural sciences	1.054	0.823	0.775	0.548
— engineering	**0.713***	**0.079**	0.603	0.121
— other	1.037	0.829	1.063	0.833
Alumnus of the employer university	**1.603*****	**0.002**	1.017	0.945
Course content design experience	**1.672****	**0.029**	**3.082****	**0.026**
Proportion of lectures in teaching load (%)	0.996	0.508	0.991	0.306
Proportion of seminars in teaching load (%)	1.002	0.777	1.006	0.526
Proportion of practical work in teaching load (%)	1.003	0.618	1.000	0.960
Engages in research activities	**1.953*****	**0.001**	**4.912*****	**0.001**
Has publications	1.269	0.263	**2.366***	**0.088**
Over the last three years, has participated in:				
— visiting teaching programs	**0.710***	**0.055**	1.012	0.965
— continuing education	**1.458****	**0.011**	1.097	0.699
— summer school	**2.243*****	**0.000**	**2.743*****	**0.002**
— teacher exchange programs	0.927	0.796	0.608	0.285
— Master's degree programs	1.340	0.261	**2.178****	**0.025**
Has a side job	0.930	0.599	1.392	0.139
Wants to quit this job	**0.673****	**0.029**	1.246	0.392
Needs training in:				
— foreign language	1.195	0.246	1.449	0.154
— ICT literacy	0.882	0.451	0.960	0.872
— dedicated computer programs	**1.429****	**0.024**	1.252	0.371
— pedagogy	0.955	0.780	0.732	0.240

	Intentions		Past experience	
	RRR	sign	RRR	sign
— one's own major	1.102	0.557	1.205	0.484
— another major	1.117	0.522	**1.711****	**0.041**
Proficiency in foreign language	**1.152***	**0.056**	**1.379****	**0.014**
Years working for the university	**0.983****	**0.038**	0.990	0.498
Married	1.144	0.396	**0.595****	**0.033**
Age /10	**2.288***	**0.050**	0.864	0.821
Age-squared /100	**0.928***	**0.080**	1.029	0.665
Male	0.797	0.116	0.901	0.642
Has children under 6 years of age	0.838	0.387	1.340	0.350
Has children aged 7–18	1.118	0.485	1.481	0.123
Assessment of one's financial status	0.997	0.960	1.131	0.194
Constant	**0.009*****	**0.000**	**0.001*****	**0.000**
Pseudo R2	0.133			
Prob > chi2	0.000			

Table 5. **Estimated multinomial regression of factors influencing engagement in MOOCs among students** (base: "never heard of MOOCs or not intending to use MOOCs"), N = 2,815

	No past experience, intending to use MOOCs		Some MOOC experience	
	RRR	sign	RRR	sign
Top university (base: regular university)	**1.278****	**0.044**	**3.070*****	**0.000**
Liberal arts university	0.871	0.536	1.077	0.895
Private university	0.859	0.529	0.252	0.166
Moscow	0.910	0.424	0.838	0.504
Male	1.125	0.308	**2.244*****	**0.001**
Field of study (base: social sciences)				
— humanities	**0.567*****	**0.003**	1.236	0.639
— natural sciences, mathematics	0.817	0.263	**1.918***	**0.077**
— engineering	**0.630*****	**0.008**	0.777	0.472
— other	**0.448*****	**0.000**	0.551	0.124
3rd-5th years of Bachelor's/Specialist's degree	0.910	0.433	1.276	0.458
Master's degree	0.788	0.189	**2.795*****	**0.006**
Academic attainment	**1.208****	**0.012**	**1.647*****	**0.007**
Pays tuition fees	1.155	0.282	1.172	0.630

	No past experience, intending to use MOOCs		Some MOOC experience	
	RRR	sign	RRR	sign
Class attendance	1.016	0.834	**0.751***	**0.070**
Engages in research activities	**1.267****	**0.039**	**2.163*****	**0.006**
Combines work and study	**2.378*****	**0.000**	1.409	0.159
Focused on knowledge acquisition	**0.903****	**0.014**	1.126	0.229
Not going to work in one's field of study	0.948	0.480	1.176	0.366
Graduate of a regular school	**0.759****	**0.011**	0.670	0.126
Suffers from the lack of basic theoretical knowledge	**0.778***	**0.079**	1.394	0.285
Suffers from the lack of analytical skills and data analysis methods	**1.329****	**0.034**	0.918	0.801
Intends to:				
— pursue a Master's degree in Russia	1.028	0.103	1.023	0.555
— pursue postgraduate education in Russia	0.989	0.476	1.017	0.638
— pursue additional education of other types	1.015	0.324	0.946	0.154
— study abroad	**1.035***	**0.062**	0.977	0.607
— work abroad	0.976	0.170	1.036	0.413
Hours spent on classroom studies	1.002	0.613	0.980	0.100
Hours spent on homework	**1.010***	**0.054**	**1.040*****	**0.000**
Assessment of parents' financial status	0.937	0.177	1.033	0.821
Number of science fiction books read	**1.040****	**0.010**	**1.106*****	**0.000**
Number of fiction books read	**1.025*****	**0.000**	0.984	0.389
Constant	0.129***	0.000	0.002***	0.000
Pseudo R2	0.108			
Prob > chi2	0.000			

The proportion of university teachers who have some MOOC experience is higher than proportions of those who know nothing about MOOCs or have no intention to participate in them among faculty members involved in research (nearly five times), foreign language teachers (3.8 times higher than among teachers of social sciences), math and ICT teachers (2.6 times), those who have attended summer schools over the last three years (2.7 times), and PhD holders (2.1 times). A somewhat weaker yet positive impact is exerted by having publications, course content design experience, Master's degree studies over the last three years, good knowledge of a foreign language, and the need to change one's university major. The probability of being engaged in MOOCs is lower among Moscow universi-

ty instructors and higher in top public universities (although the latter variable is not too significant).

Intentions to learn in MOOCs are observed less often among teachers who have never heard of MOOCs or have no MOOC experience and are more likely to be found among instructors who are engaged in research activities, have enhanced upgraded their skills in summer schools, and/or have graduated from the university they work for, as well as PhD holders and math and ICT teachers (as compared to teachers of social sciences). Other positive factors include the need to acquire new knowledge in dedicated computer programs, high proficiency in a foreign language, and experience of designing course content. On the contrary, willingness to learn in MOOCs is lower among teachers of engineering subjects, those who would like to quit teaching, and those who have worked for the university for a while. Age dependence is quadratic (but significant at the level of 10%); type of university makes no difference.

Therefore, demand for MOOCs among university teachers is first of all contingent on their autonomy and innovativeness as well as their inclusion in global educational initiatives: engagement in science, fluency in English, participation in various research activities, and enhancement of their professional skills. Disturbingly, teachers in engineering universities remain conservative about MOOCs. This is probably one of the indicators of morbidity of engineering education in Russia, which is partly caused by excessively narrow specialization, which results in shifted perceptions of one's own irreplaceability, insufficient involvement in global education initiatives, and predominantly weak students (students of many engineering universities have low USE scores, including those in mathematics).

As for students, the probability of learning in MOOCs is the highest in top universities, being three times higher than in regular public ones. In addition, as compared to students who have never heard of MOOCs or do not intend to participate in them, the likelihood of having some MOOC experience is 2.8 times higher among Master's degree students than among students in their 1st or 2nd year of Bachelor's or Specialist's degree, 2.2 times higher among males, and 2.16 times higher among students engaged in research activities. Other significant positive factors include academic attainment, specialization in natural sciences (as compared to social sciences), hours spent on homework, and number of science fiction books read over the last six months. Class attendance appears to be the only negative factor here.

Willingness to participate in MOOCs is found more often in students who have a job (2.4 times more often than in non-working students), study in a top university (1.3 times more often than in students from universities of other types), and engage in research (1.3 times more often than in those who do not). Learning in MOOCs more often attracts high performers, students intending to study abroad, those who devote a lot of time to their homework, those who read more fic-

tion and science fiction, and those who believe they lack analytical skills. As compared to students specializing in social sciences, lower proportions of students planning to learn in MOOCs are found in humanities, engineering, and other fields of study. Other negative factors include the focus on acquisition of practical skills in university (as compared to the focus on independent acquisition of knowledge), the lack of basic theoretical knowledge, and graduation from a regular (non-specialized) school. Similar to faculty members, students' attitude towards MOOCs is largely an indicator of innovative behavior, which involves being part of a top university, engaging in research, reading a lot, and showing good academic performance.

4. Conclusion

So far, MOOCs have been little integrated in the learning process of Russian university students. The use of online learning technology is not yet massive, being restricted to innovators only. Overall, faculty members are better informed about MOOCs and engage in them more actively than students. Demand for MOOCs among students depends on the type of university: online courses tend to permeate student practices in top universities much more often than in regular ones. Therefore, the fundamental hypothesis of this study has been confirmed first of all with regard to the demand for MOOCs among students, although the likelihood of having past MOOC experience is also higher among teachers of top universities than among their colleagues from regular universities (at significance level of 10%).

While university teachers appear to be more aware of MOOCs than students, the latter tend to favor the substitution of MOOCs for offline courses more often than teachers. Only 4–6 percent of the faculty and 16–22 percent of the students spoke definitively for the initiative, which is an expected outcome. While bringing new opportunities to students, MOOCs may as well bring new risks to teachers, including the loss of their "teacher benefits", stiffer competition, or even dismissal. Progress in using MOOCs in higher education is hardly possible without organizational changes. Competition risks will cause resistance from the teaching faculty, so behavioral models for universities must be designed to outline possible prospects for teachers in case of large-scale MOOC integration. Such prospects may be related to the development of blended learning that combines MOOCs with traditional classroom practices.

Regression analysis of empirical data shows that the probability of engaging in MOOCs is higher among active and high-performing students and instructors who have engaged in research and upgraded their skills in summer schools. Studying in a top university has a strong positive correlation with the likelihood of learning in MOOCs among students, yet for teachers the factor is less significant. On the whole, readiness for MOOCs in both students and faculty of Russian universities is a pivotal characteristic of innovative behavior.

About half of the students treat MOOCs as a tool for personal development rather than as an alternative or complement to their university education. For the faculty, MOOCs represent a decent alternative to traditional professional development courses. Teachers who have already tried MOOCs often mention mastership of new teaching methods among their goals.

Instructors and students similarly assess advantages and risks of using MOOCs in education. For now, the advantages of greater access and self-paced learning prevail over all the other indicators of quality education. Both faculty members and students feel positive about substituting MOOCs for courses in general fields of study but show no enthusiasm or even oppose replacing specialized (professional) disciplines with MOOCs. Both categories of learners agree that the main risks and challenges of using MOOCs have to do with the lack of teacher feedback, weak motivation for course completion due to self-regulation, and unreliable test taker identification technology. Perception of these risks shapes the main vectors of technology and organizational development required to promote MOOCs into the education system. These revolve largely around the need to develop proctoring algorithms (learner identification, prevention of academic dishonesty), apply blended learning (which complements MOOCs with teacher feedback), and regulate self-learning practices to solve the problem of external control and motivation.

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My Five Major Challenges as a Teacher

Discussion. Moscow, National Research University Higher School of Economics, September 8, 2017

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Abstract

The discussion on *My Five Major Challenges as a Teacher* was the first meeting within professional development program for HSE faculty, namely, *Teach for HSE*. The program is designed to improve teaching skills and represents a working tool that will allow any committed teacher to either design a new course from scratch or to redesign an existing one. Participants will discuss teaching models adopted by the leading universities. In the first cycle, the focus will be placed on problem-based learning. The organizers hope that the program will stimulate an ever wider discussion on teaching to evolve.

In this paper the reader is introduced to four personal reflections on teaching experiences by teachers in widely different domains: sociology, economics, political science, and English as a foreign language. Even though they have been teaching to college students for many years, every day they have to answer questions regarding what to teach, how to teach, what to teach for, and whom they teach.

Keywords

higher education, teaching, Teach for HSE, academic skills, problem-based learning, assessment, feedback, digital technology.

Teacher Education and Advanced Training in German Settlements of the Taurida Governorate

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Abstract Archival materials and contemporary studies are used to identify the specific features of teacher education and advanced training in German colonial schools in the Taurida Governorate. The paper investigates into the conditions under which German colonists' educational institutions evolved, comparing the data on changes in the number of German primary schools and central vocational schools in the Taurida Governorate. It also describes the specific aspects of teaching organization and education content in central vocational schools as educational institutions of advanced type designed to train teachers for German primary schools. Such forms of advanced training for German teachers as temporary teacher education courses and pedagogical conferences are presented.

Keywords German settlements, colonial schools, teacher training, central vocational schools, advanced training, Taurida Governorate.

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Different Schools to Different People: The Future of Universal, Uniform and Quality Education

Review of the book: Lyubzhin A. Sumerki vseobucha. Shkola dlya vsekh i ni dlya kogo [The Twilight of Universal Education. School for All and for Nobody]

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Abstract Education practices inherited from the Soviet school are fading away and will hardly be inspired with new life. Society has changed, and so have the education goals, which rarely become the subject of rational discussion nowadays. As a response to these new conditions, it would be good to see diversification of the education system, so that everyone could get what they want, whether it be effortless learning or real education obtained through hard work. Today, unfortunately, education remains uniform and the window of opportunities is not growing larger.

Keywords universal education, high-end education, Soviet educational system, gymnasium, education reforms.

"Barometers" of Influence, or Factors Which Have the Greatest Impact on Learning

A Review of John C. Hattie (2009) Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement

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Abstract This review article discusses the results of a fundamental research on factors affecting the educational achievements of students. Among the discussed concepts are meta-analysis, synthesis of meta-analyses, barometers of influence, and effect size. The author presents an abstract overview of the book contents by chapters and analyses the six main sources of influence: the student, the family, the school, the teacher, the curricula, and teaching and learning approaches. Examples of specific factors (including effect size) are presented, such as biographical factors, feedback, meta-cognitive strategies, repeated reading programs, homework, school finances, class size, etc. The reviewer draws the conclusion that, despite its uniqueness, which appears in the coverage of meta-analyses and the amount of considered factors, the results of John Hattie's study should be transferred to Russian educational practice very cautiously.

Keywords John Hattie, visible learning, meta-analysis, student achievements, factors of influence, size effect.

Rural Schools: Between the Scylla of "Continuity" and the Charybdis of "Excessiveness"

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Abstract The article provides a historical perspective on a key conflict in the development of rural education, which is that it is usually accompanied by rejection of rural labor and expansion of "pro-urban" orientations and practices among youth.

Since the Russian Empire of the late 19th century, throughout the Soviet Union, and into post-Soviet Russia, the government has been trying hard to retain rural population where it is and to ensure "continuity" of rural youth's agricultural activities (in the terms of the expert rhetoric of the late 19th century). Education policy makers of the Russian Empire believed that the reason for youth rejecting rural labor was the "excessiveness" of school education with regard to actual agricultural needs. Such excessiveness was normally fought by bringing down the level of school education attainment and reducing school hours in favor of agricultural education. The same policy, if only otherwise formulated, resonates in both the Soviet and the post-Soviet periods. No constructive solution has been found yet to solve the problems of rural education, and rural schools in particular. The fundamental conflict in such development can only be resolved in the context of emerging new conditions of rural existence (agro-industrial complex, distance learning).

Keywords rural youth, education, rural school, restructuring, rejection of rural labor, education policy.

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