A Regional Socio-Geographic Atlas of Secondary Education:

Can the "Power of the Territory" Be Surmounted?

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Abstract. A socio-geographic atlas of secondary education in Kaliningrad Oblast has been made after testing new instruments designed for measuring educational inequality at regional and local levels, its reasons and consequences, and the factors affecting its manifestation. The data for the atlas was obtained from open databases on education quality, information on the region's attractiveness as a location for real estate investments provided by real estate agents, and the results of measuring the distance of schools from the hubs of social wellbeing. The main assumption at the base of the study is that the influence of environment (factors external to school) on education quality dominates the importance of internal processes. A comparative analysis of the resulting maps of education and territory quality has revealed not only individual resilient schools and schools that require support but also the low quality zones and socio-geographic anomalies of academic resilience. The article offers methods for studying and overcoming the "curse of the territory" and educational inequality at regional and local levels.

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

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1. The Need to Contextualize Educational Outcomes

The problem of contextualizing the outcomes of school education remains pressing for the Russian education system and only grows more acute with the mass distribution of rankings based on USE[1] and Olympiad scores, which rather indicate the inequality of opportunities than measure the quality of schooling.

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

[1] Unified State Exam

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

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

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

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

The study makes some essential assumptions:

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

2. Educational Inequality Factors

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

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

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

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

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

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

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

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

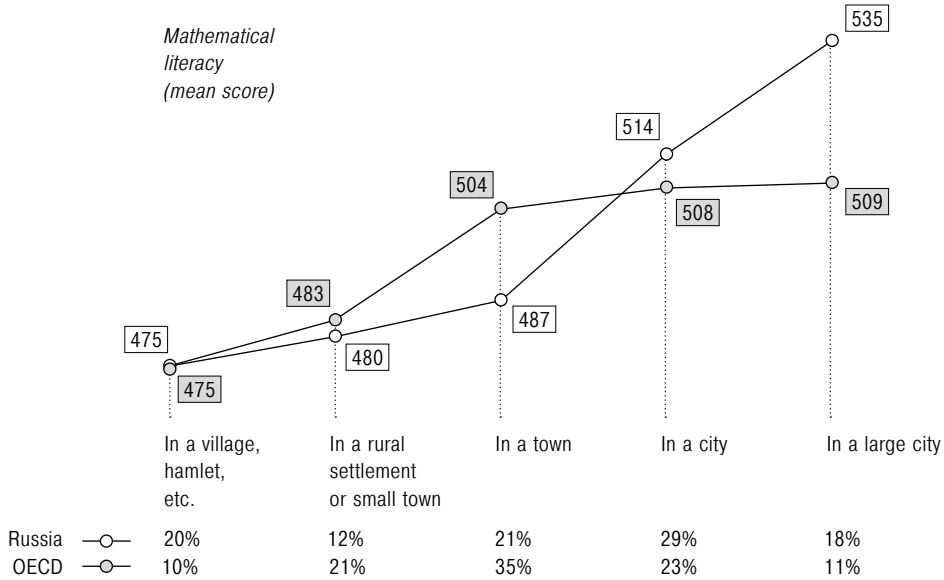
Russian researchers identify three main factors that determine educational inequality: socioeconomic status; school differentiation; and territory [Yastrebov, Pinskaya, Kosaretsky 2014]. The latter, in our view, is the determining and integral factor, as it affects geographical distribution of families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

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

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

Most often, regional and municipal centers compare favorably to

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



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

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

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

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

3. Approaches to Studying Unequal Conditions

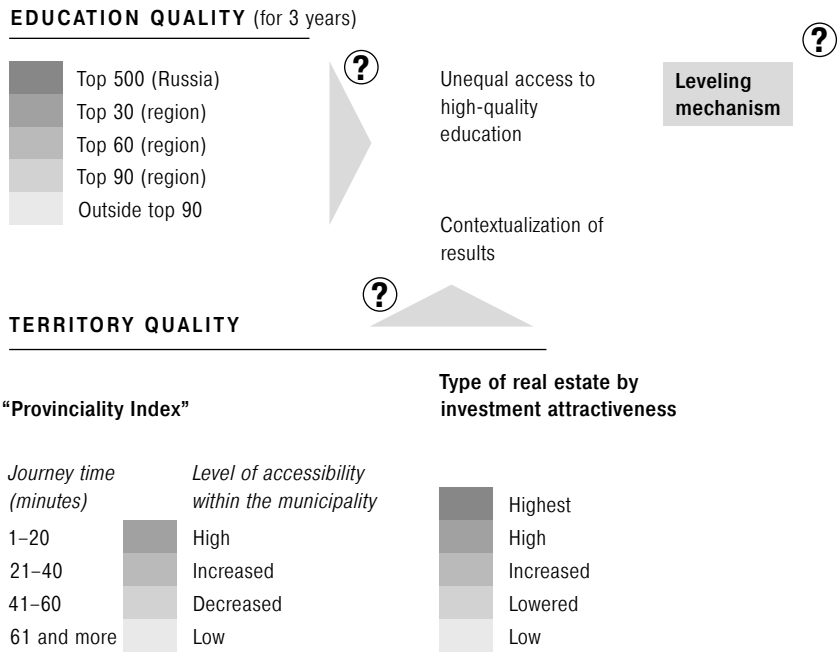
The international practice of considering specific social context indicators while assessing educational outcomes cannot be always transplanted into Russian reality to assess municipal and regional education systems. For example, using such indicators as ethnic composition or the proportion of immigrants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

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

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

The analysis of educational inequality factors implies evaluating

Figure 2. **Study design scheme**



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

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

4. Material and Method

The study design is schematically represented in Figure 2.

4.1. Education quality assessment methods

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

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

fundamental indicators: (i) performance in Olympiads at regional level and higher, and (ii) USE (2013–2014) and BSE[2] (2015) scores. Besides this, experts also took into account the non-selective admission principle (which increased the total points by 20%);
- the website of the Ministry of Education of Kaliningrad Oblast that uses the national ranking results to determine the top 30 schools at each education level.

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

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

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

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

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

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

4.2. Educational inequality factor assessment methods

4.2.1. Territory attractiveness for settlement

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

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

[2] Basic State Exam

4.2.2. Accessibility of the centers of relative socioeconomic wellbeing

The expert assessment method did not work when it came to defining the territory quality of remote settlements, as the real estate agents reported extremely rare sales, if any, in many of them for the last ten years. In this case, the territory status was assessed by measuring the remoteness of schools from the nearest center of relative social wellbeing defined by the experts—not the actual distance but transport accessibility of the regional and municipal centers with their social and educational resources. To take into account the quality of roads and permissible speed limits, we used not the actual distance in kilometers in our calculations but rather the journey time in minutes, as predicted by Yandex Navigator[3]with the "traffic mode" disabled. The municipal centers appeared to be the only centers of relative socioeconomic wellbeing in their municipalities in all cases, except one. As for Guryevsk Urban District located around Kaliningrad, the journey time to the centers of Kaliningrad and Guryevsk was summed up and divided in two. At this stage of method validation, it seemed to be impossible to determine the differences in influence on school performance between these two centers of socioeconomic wellbeing. Therefore, common accessibility of resources in both administrative centers was defined by summing up the estimated journey time without applying correction coefficients or calculating the mean value.

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

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

The distance of 30 km was defined as the limit of positive effects that a center could have on relative social wellbeing. The school bus transportation rules[4] require that journey times do not exceed 30 minutes one way. Given the speed limit of 60 km/h, the maximum permissible distance for regular school bus routes is 30 km (the value is normally lower under real road conditions, especially in rural areas).

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[3] https://maps.yandex.ru

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

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

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

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

The walking distance indicator of 2 km was used to assess the accessibility of specific cultural and sports facilities attended by school students on their own. The specified value is stipulated by par. 2.5. of SanPiN[5]in relation to junior school students for the climate zone which Kaliningrad Oblast is part of.

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

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

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

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

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

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

5. Findings and Discussion

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

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

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

5.2. Quality of education in Kaliningrad Oblast schools

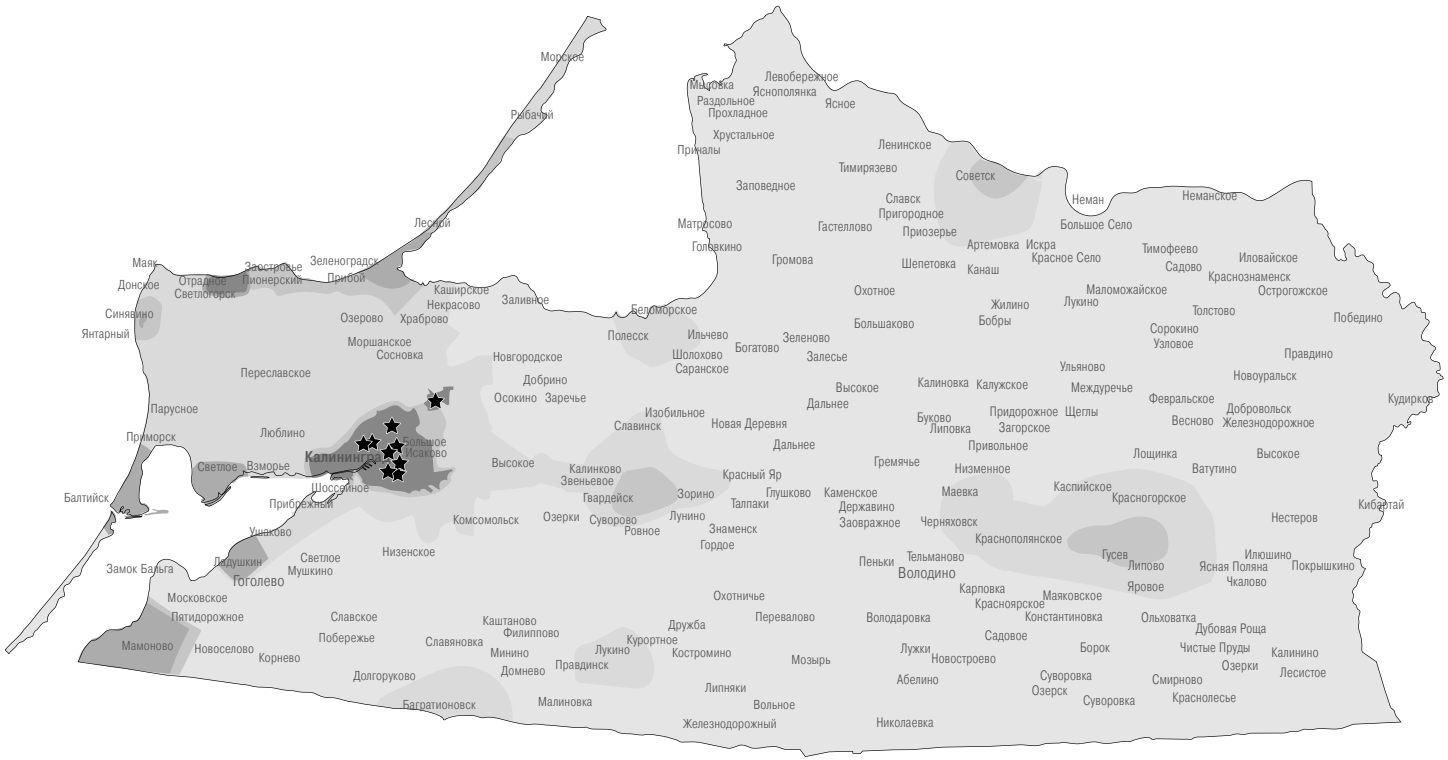
Kaliningrad Oblast also compiles a regional school ranking on an annual basis, defining the top 30 schools at each level of education. Unlike the Top 500, this ranking considers not only academic performance but also a number of context indicators: the proportion of students with criminal records, the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

5.3. Territory quality

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

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

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

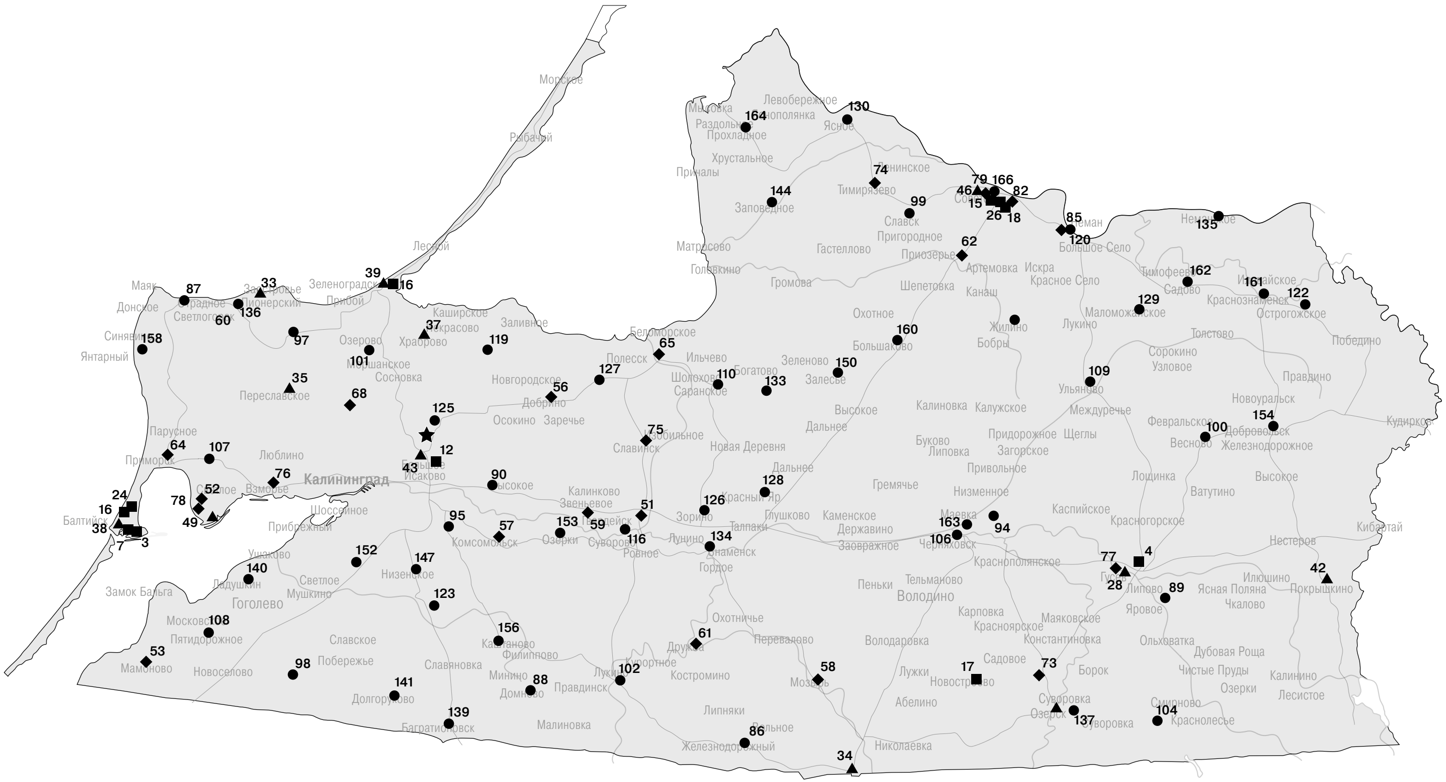


Territory quality

- Top
- High
- Increased
- Decreased
- Low

★ Schools ranked among the top 500 Russian schools in 2013, 2014, and 2015.

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



Качество образования

- ★ Schools ranked among the top 500 Russian schools in 2015
- ■ High (ranked among the top 30)
- ▲ Increased (ranked from 31st to 60th)
- ◆ Decreased (ranked from 61st to 90th)
- ● Low (ranked 91st and lower)
- **51** Average position of school in the regional ranking of education quality in 2013, 2014, and 2015

Figure 5. **Zones of different territory quality in Kaliningrad Oblast**

Figure 6. **Relationship between education quality and territory quality**

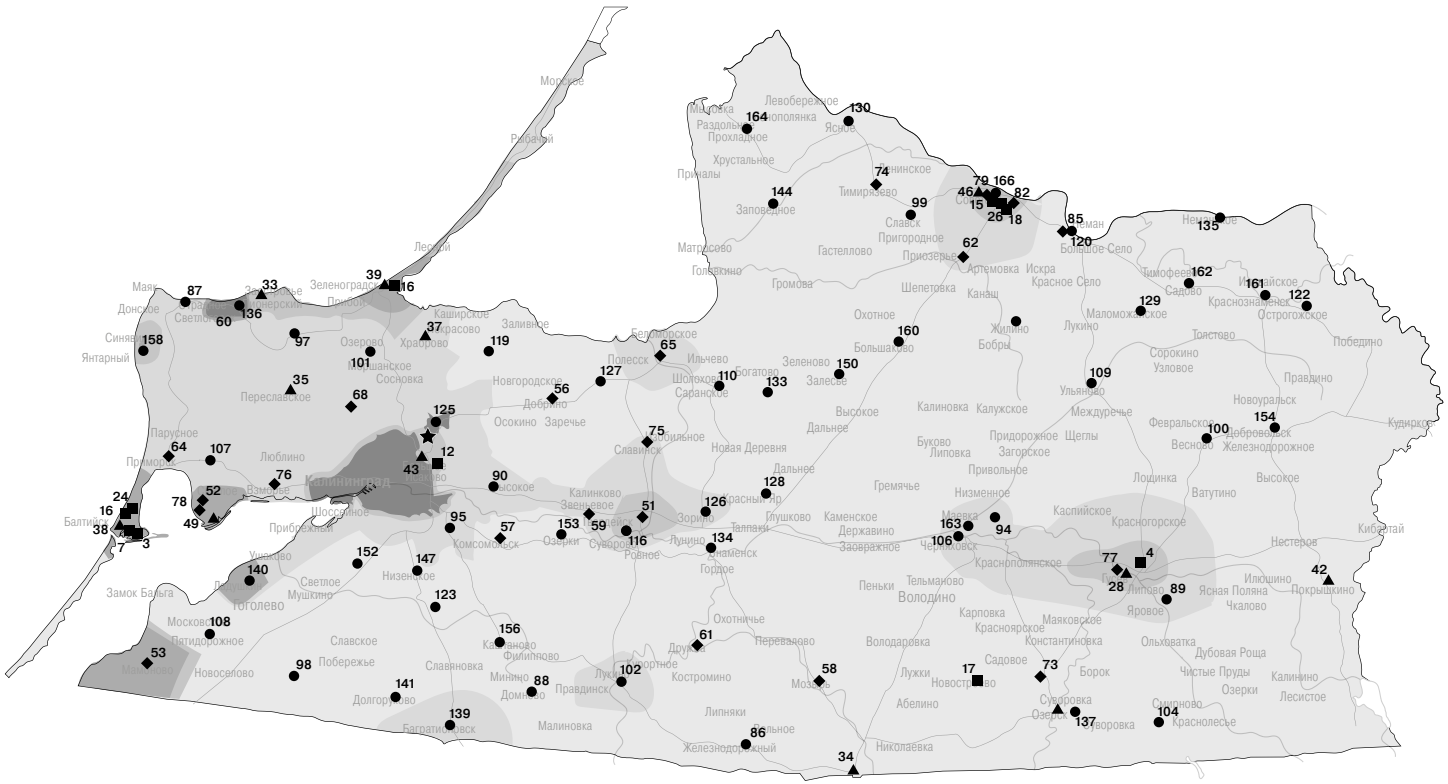
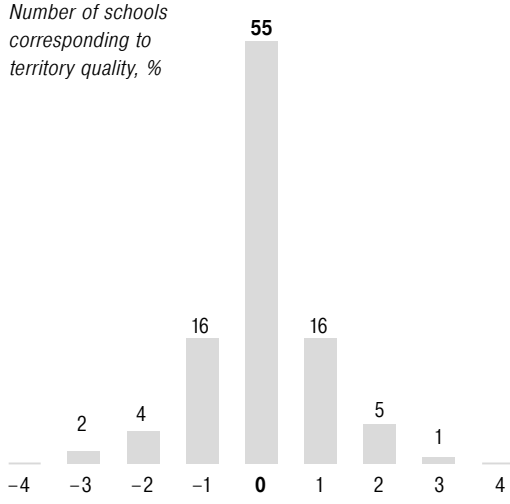


Table 2. **Distribution of schools among the categories depending on their resilience to socio-geographic context**

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

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

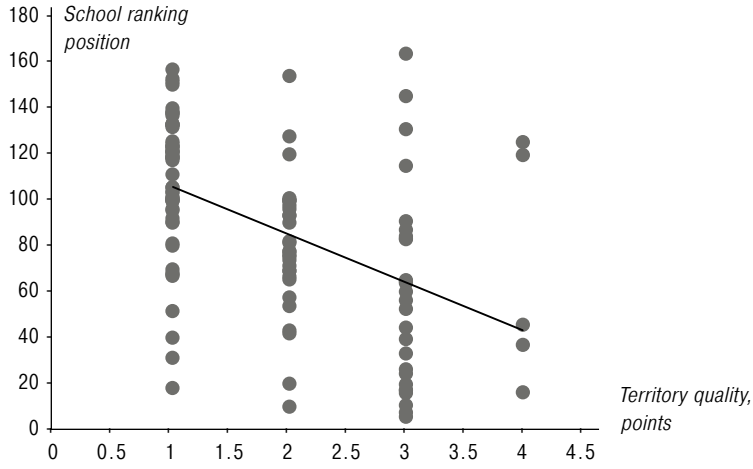


that is very diverse in conditions, experiencing a strong influence of large municipal centers and the regional capital, and (ii) the East, which consists mostly of zones of decreased and low attractiveness (Fig. 5).

5.4. Relationship between ranks of territory quality and education quality

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

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



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

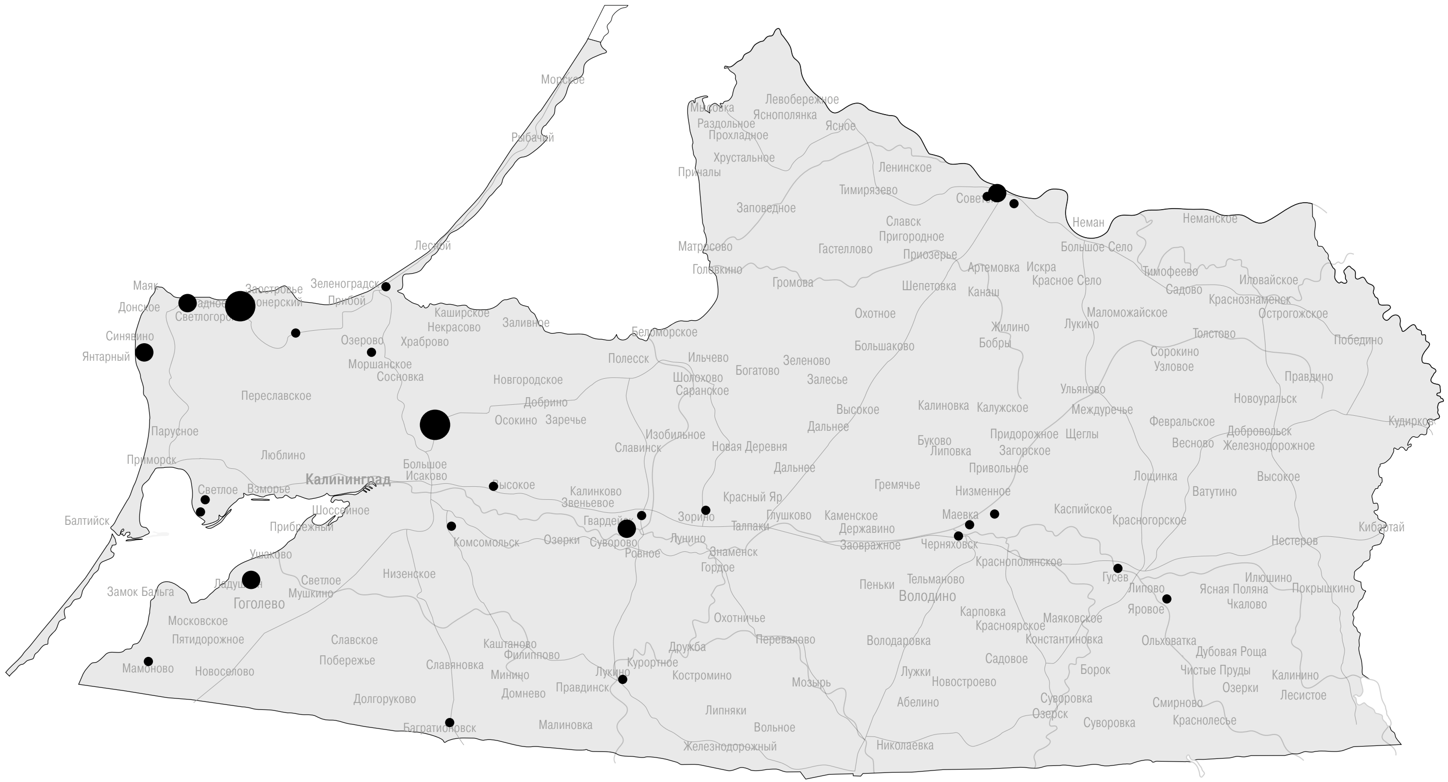
The frequency distribution graph (Fig. 7) shows that education quality does not exceed territory quality in 77.6% of cases (80 of 116 schools outside Kaliningrad). This is true and even more frequent (80.9% of cases) in rural areas outside small towns. Education quality corresponds to that of the territory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

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

5.5. Schools requiring support

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

Figure 9. **Location of schools requiring support**



Education quality lower than territory quality by one rank

Education quality lower than territory quality by two ranks

Education quality lower than territory quality by three ranks

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

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

5.6. Low education quality zone

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

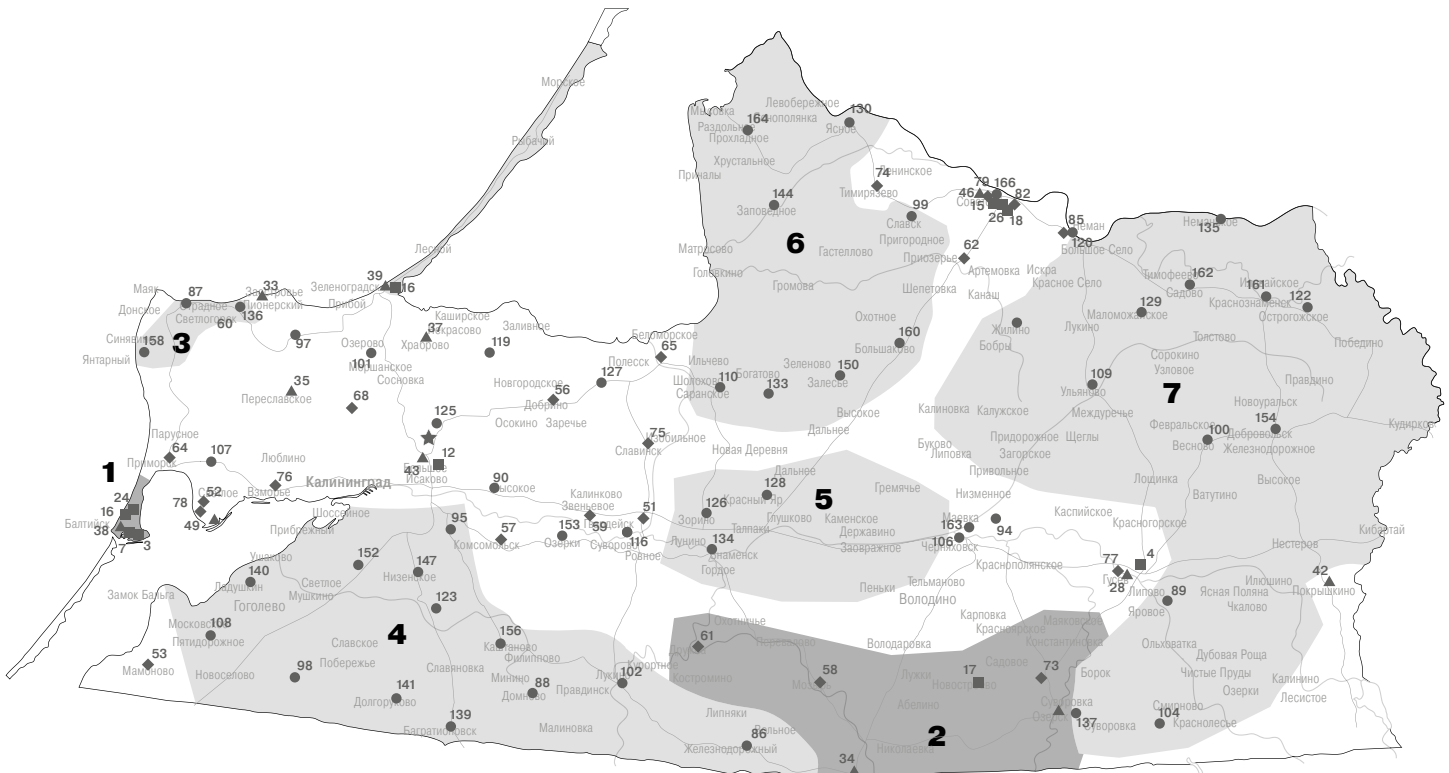
The smallest western zone (No. 3 in Fig. 10) includes three schools, of which the school in Svetlogorsk deserves special attention, showing the maximum difference of three ranks between education quality and territory quality. The reasons for the low performance of a school located in an attractive resort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

5.7. Resilient schools

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

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

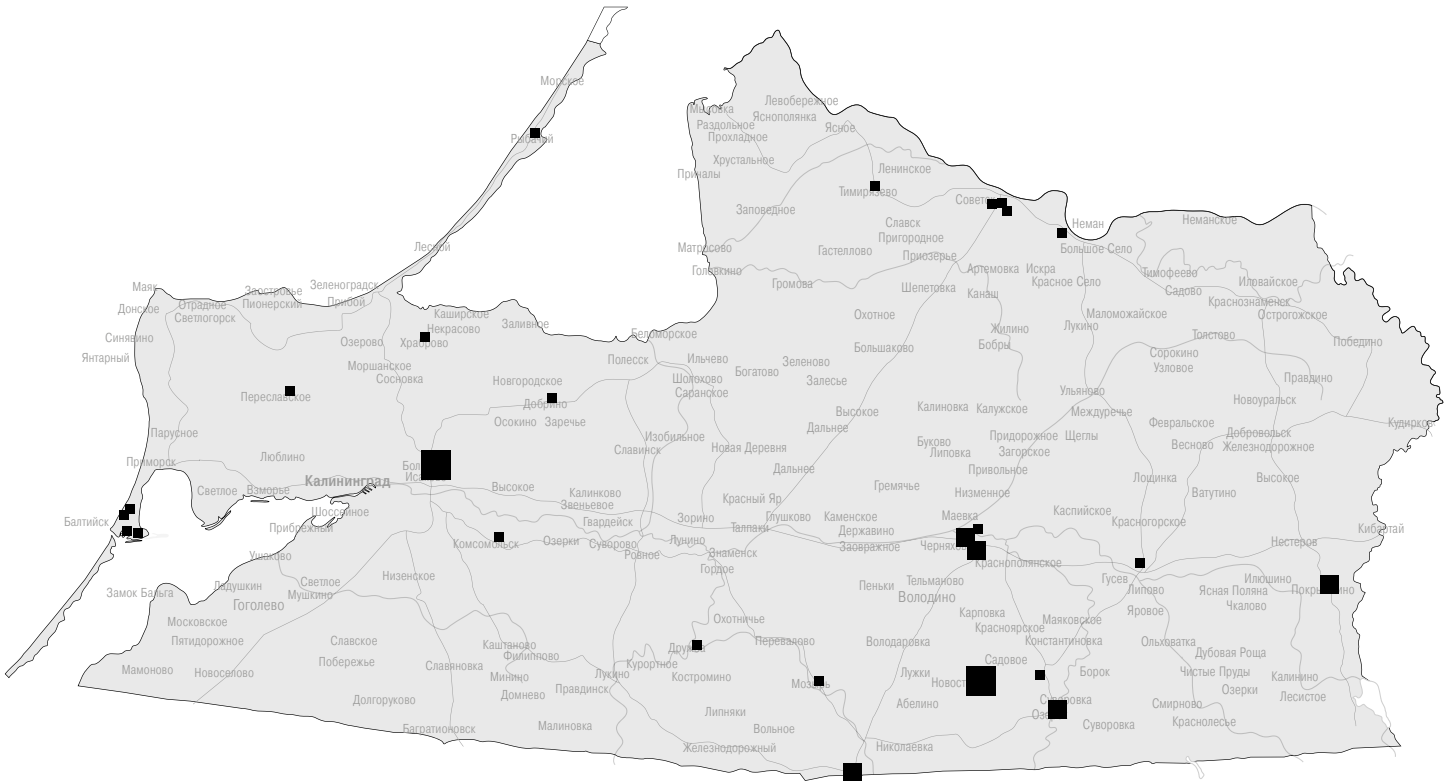
Figure 10. **Relatively low education quality zones and resilience zones**



Resilience zone

Relatively low quality zone

Figure 11. **Location of resilient schools**



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

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

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

5.8. Inequality in small towns

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

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

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

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

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

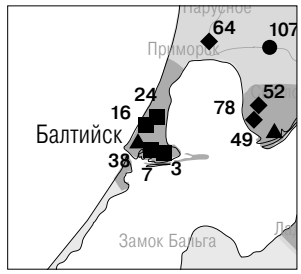


Figure 14. **Education quality inversion east of Pravdinsk**

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

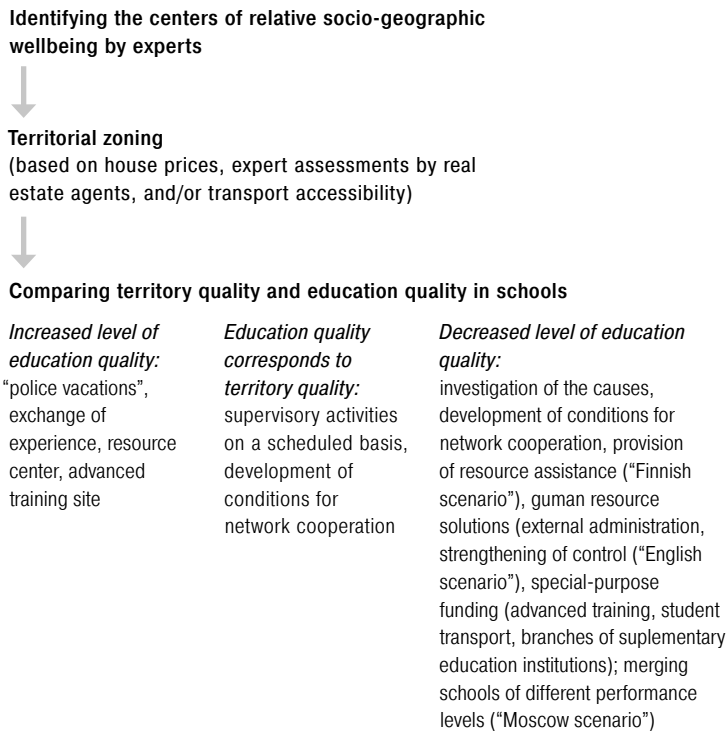
5.9. "Equality of the strong" in Baltiysk

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

5.10. "Quality inversion" in Pravdinsk

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

Figure 15. **Educational inequality evaluation scheme**



6. Suggestions on using specific tools to study educational inequality in municipal and regional education policies

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

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

7. Conclusions

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

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

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

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

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

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

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