

Factors Behind Regional Inequality in Education in Kazakhstan

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“I do not see how one can look at figures like these without seeing them as representing possibilities. [...] The consequences for human welfare involved in questions like these are simply staggering: once one starts to think about them, it is hard to think about anything else.”
—Lucas, 1988

In the fall of 2016, Kazakhstan was building momentum in the international educational arena. For the first time, the country’s school students ranked in the top 10 internationally for their performance in math and science, according to the Trends in Mathematics and Science Study (TIMSS).¹ Kazakh fourth- and eighth-graders demonstrated ability and knowledge comparable to their peers from countries like Finland, South Korea, and Singapore and outpaced students from Great Britain, the USA and Australia, a reality that was disappointing to the latter group of countries.²

This was a great achievement for the country and indicated the ris-

ing quality of education at national level. Yet when disaggregated by region, language, or urban/rural residence, the data from TIMSS and other large-scale assessments paint a bleaker picture.

There is a knowledge and skill gap of several years between students from different regions of Kazakhstan. According to the results of the OECD’s Programme for International Students Assessment (PISA), most recently administered in Kazakhstan in 2015, 15-year-olds in the West and South of the country (Atyrau, Mangystau, South Kazakhstan, and Almaty oblasts) are at least two years behind their peers in Almaty city in reading, math, and science. As a national report on the PISA results shows, half of 15-year-olds in Atyrau oblast are “functionally illiterate” in science,³ while more than half of students in South Kazakhstan⁴ and Mangystau oblasts are functionally illiterate, meaning that they could not complete tasks of the first level of difficulty.

This seems like an unacceptable reality for a unitary state that is

committed to the education of all citizens. As Lucas put it, if one considers the consequences for human welfare, it is hard to think about anything else.⁵ Although Lucas was talking about national-level performance, wondering if one country’s positive economic experience might be applied to another, I find his words staggeringly appropriate for the situation in Kazakhstan.

Once we start to analyze a country’s economic performance, we inevitably circle back to the quality of education. Since school is—and will long remain—the single institution where a citizen spends the longest period of his/her life, it has both the highest privilege of and the biggest burden of responsibility for his/her “formation.”

In this paper, I analyze *regional student achievement* in Kazakhstan from the basis that it is vital for regional and national human capital development and predetermines a country’s potential for economic growth. In other words, I argue that education is the single most important factor in developing a nation’s human capital and thus determining its economic growth. Achieving positive change therefore requires understanding the factors behind gaps in student achievement.

Theoretical Framework

Education, Human Capital, and Economic Growth

Human capital is generally understood as the collection of skills and experiences that an individual, firm, or country possesses. The World Economic Forum defines human capital as “knowledge and skills people possess that enable them to create value in the global economic system.”⁶

In his seminal work “On the Mechanics of Economic Development,” Lucas formulates human capital as the “skill level” of an individual, linking it directly to work productivity.⁷ The World Bank defines human capital as the “knowledge, skills, and health that people accumulate over their lives, enabling them to realize their potential as productive members of society.”⁸

Today, there are several international surveys performed by major analytical institutions measuring the quality of human capital worldwide. These include the UNDP’s Human Development Index (HDI), the World Economic Forum’s Global Competitiveness Index (GCI), and the World Bank’s Human Capital Index (HCI). In addition to rankings, such studies provide thorough analysis of human capital components and the trends in their development.

As World Bank experts note, “a country’s human capital is critical for its economic success,” comprising 64 percent of a nation’s wealth.⁹ The notions of *human capital and economic growth* are tightly intertwined

in policy and economic discourse across the globe, with studies showing a positive correlation between the two. Pelinescu found a positive relationship between a country’s capacity to innovate and its GDP per capita.¹⁰ Barro compared the potential input of human and physical capital to economic outcomes, noting that a higher ratio of human to physical capital “tends to generate higher economic growth” due to both a country’s capacity to absorb technology and the fact that human capital is more difficult to adjust than physical capital.¹¹ Therefore, “a country that starts with a high ratio of human to physical capital—such as in the aftermath of a war that destroys primarily physical capital—tends to grow rapidly by adjusting upward the quantity of physical capital.”¹²

The OECD views education as central to human capital development, observing a correlation between education level, GDP per capita, and overall economic growth.¹³ Education is often used as a proxy for human capital in studies of the effect of human capital on economic growth. Blundell et al., for example, identify three main components of “human capital”: early ability (acquired or innate); qualifications and knowledge acquired through formal education; and skills, competencies, and expertise acquired through on-the-job training.¹⁴

Thus, there seems to be a strong sense that there is a direct correlation between education and the country’s overall economic performance. In fact, education parameters are present in every major human capital index:

- “Expected Learning-Adjusted Years of School” is one of the three components of the Human Capital Index (along with “Survival” and “Health”). The component reflects the quantity and quality of education.¹⁵ The measures “adjusted years of schooling” and “harmonized test scores” have been developed by World Bank experts to better reflect the quality of schooling.¹⁶
- In its Global Human Capital report, the World Economic Forum placed knowledge and skills at the core of all four key elements of human capital.¹⁷ “Capacity” stands for the formal education level of the population, while “Development” measures the formal education and upskilling of the workforce and the next generation. “Deployment” and “Know-How” measure adults’ application of their skills and the depth of specialized skills that labor market participants possess.
- The Global Competitiveness Index (GCI), an annual survey of cross-country competitiveness also performed by the WEF, analyzes countries’ performance on 12 main pillars, including “skills.”¹⁸

On all of these rankings, education is represented by two main indicators: the highest level of education obtained by the population (or years of schooling) and educational outcomes in math, science, and reading as measured by international large-scale assessments (ILSAs).

As OECD experts note, all economic growth theories “see education as having a positive effect on growth.”¹⁹ Barro and Lee’s database of international data on

average years of schooling is often used as a point of reference when calculating the effect of education on economic outcomes like GDP per capita.²⁰ Return on investment in education is normally calculated as the ratio of costs incurred by a citizen or a state to his/her earnings at the given moment.²¹

The effect of education on countries' economic performance has been confirmed by multiple studies, performed both by larger institutions like the World Bank and by individual researchers.²² In the United Kingdom, for example, it has been found that citizens with formal qualifications "have significantly larger returns than individuals with the same number of years of schooling but who completed no formal qualification."²³

In their analysis of the determinants of economic development in 110 countries, Gennanioli et al. have tested the effect of geography, education, institutions, and culture, finding education

to be the single most influential variable explaining variations in income level both between and within countries.²⁴ The authors' analysis of data for over 1,500 subnational regions showed that education is the only factor that explains a substantial share of regional variation.²⁵

Thus, I do not plan to go into much detail on this aspect. It is, however, worth mentioning several major trends that can be observed from these studies:

- There is strong evidence that primary education brings a higher return on investment than secondary or higher education. This is due to the foundational quality of the first years of education, when an individual's cognitive abilities are formed. As the effect of education is cumulative, the returns on secondary or higher education (any additional year of training) tend to be smaller.²⁶

- Return on investments in girls' education are higher than those on investments in educating

boys. Blundell et al. have found that the average annual return for men with a first degree is almost two times less than for women.²⁷

- Finally, less economically developed countries tend to enjoy higher rates of economic growth than developed ones (due to the diversity of needs and spending in more developed countries).²⁸

Researchers often refer to large-scale studies like PISA (Programme for International Student Assessment), TIMSS (Trends in International Mathematics and Science Study), or PIRLS (Progress in International Reading Literacy Study) to calculate return on investment in education. These studies provide the most thorough and representative database on international academic performance.

There are plausible concerns about whether it is entirely appropriate to use the tests to measure quality of schooling—that is, the extent to which absolute learning outcomes represent school processes and the factors that

Box 1. International Large-Scale Assessments

- PISA is administered by the OECD and tests 15-year-olds' competencies in reading, science, and math. The assessment takes place once every 5 years, with roughly 45-50 participant countries in each round. The OECD does not rank the countries on the basis of their results, instead preferring to group them into broader clusters. However, the test scores allow countries to determine their positions in relation to other countries.
- TIMSS and PIRLS are performed by the IEA once every four years. While TIMSS tests fourth- and eighth-graders' knowledge of math and science, PIRLS targets only fourth-graders, assessing their reading literacy. The IEA's results are more straightforward than those from the OECD in the sense of producing a clear ranking of countries on the basis of their test results.
- The principal difference between the PISA and TIMSS assessments (which overlap in their coverage of subjects and also age groups) has been articulated as a difference in the *areas* measured. While PISA problems aim to measure functional literacy (ability to apply knowledge learned to real-life situations), TIMSS provides data on the extent to which a student has effectively consumed the school curriculum.⁸² Both studies disaggregate their test results by level of difficulty and collect background information about factors that influence academic performance: student's family, school infrastructure, teacher training, etc.

impact overall academic success. There is also a question about the appropriateness of using “years of schooling” (normally the period of pre-school and school education) to measure human capital. One of the main reservations is that such an approach automatically assumes that every country in the ranking (or every region in a country) delivers the same amount and quality of learning to every student in one year of schooling, which is undoubtedly not the case. According to the authors of the Human Capital Index, there is “a gap in human capital formation: students are in school but are not learning.”²⁹ The OECD argues that measuring cognitive skills allows for a more objective analysis of economic growth than does a mere measurement of the quantity of school years attained.³⁰

However, given that these assessments remain the primary sources of insight into academic achievement in the international context, they will probably continue to be utilized for human capital studies for a long time yet. Barro found that international test scores have strong explanatory power for economic growth and are more accurate in predicting it than years of schooling.³¹

Factors Influencing Educational Outcomes

Students’ socioeconomic status (SES), mostly understood as their family background and exposure to learning resources, is the contextual factor most often seen to impact student achievement in academic research. Studies like PISA or TIMSS, along with other

international databases, make it possible to study the effect of a particular variable on educational outcomes.

Harding et al. and Crede et al., for instance, studied impact of parental education on student achievement.³² Parents’ career level was also found to influence student achievement,³³ as was a child’s access to educational resources at home.³⁴ Blundell cites local environment and the quality of schools in a student’s neighborhood as affecting educational attainment.³⁵

Interestingly, a number of recent studies have focused on—and demonstrated—the direct and indirect influence of a mother’s human capital on the development of her child. Harding et al. constructed a framework in which a mother possesses a certain level of social, cultural, and human capital that she can transmit to her child.³⁶ These modes of transmission may include choosing a better school, finding better educational opportunities, her implicit behavior, and even the “quality” of her immediate social circle (friends and colleagues).

However, a mother’s commitment to work does not show such a clear positive influence on a child’s academic success or future earnings. Wilson has found that having a mother who works full-time correlates negatively with a child’s income level in his or her early twenties.³⁷ Muller likewise found that children whose mothers work part-time achieve better results than their peers with mothers who are employed

full-time.³⁸

As yet, there is not much evidence or research on the possible influence of an individual’s values on his/her academic performance and subsequent “success in life.” Nevertheless, in this paper I place a certain amount of emphasis on this aspect, as there are indications that this might be the next most important impact factor behind a student’s SES.

For instance, according to Wilson, one’s decision to proceed to another level of education might be influenced by perceived economic returns on schooling and by the advantages (utilities) an individual actually experiences given his/her socioeconomic background. She has found that both perceived economic returns and students’ SES influence their educational attainment. The accomplishments of older individuals in their neighborhood, who have a similar background, influence students’ perceptions of the value of education, perhaps prompting them to want to acquire higher education. In other words, “youths respond rationally to economic incentives in education.”³⁹

This utility-maximizing perspective is predominantly shaped by the surrounding neighborhood and/or by students’ immediate circle of communication. The more successful are those who have proceeded to higher education and are now working, the higher are the chances that a school graduate will follow their example. By contrast, if the costs of getting higher education (including

the potential loss of income compared to being employed during this period) are too high in the eyes of a teenager or his/her parents, the young person might opt out of going to university. This calculus might also influence a student's interest in learning while still at school—if there is no point of going to university, then doing well in school also loses its value: as Edgerton et al. put it, “perceived penalties for underperforming academically may pose less of a deterrent to lower SES students who are not anticipating substantial return from continued formal education, while the cost of underperforming for higher SES students may be perceived more intensely.”⁴⁰

Regional development is another important factor influencing student achievement. Since the economy of the region is reflected in the quality of life of students' families and in their neighborhoods, regional development is often seen as having an indirect impact on student achievement. Edgerton et al., for example, assert that “observed interprovincial differences in academic proficiency are in general consistent with long standing disparities between provinces in fiscal capacity.”⁴¹ This is echoed by Tesema and Braeken, who found in their research on the regional factors impacting education in Ethiopia that “whenever different regions within a country have major economic differences, it is likely that students from economically less developed regions are more disadvantaged.”⁴²

Gennanioli et al. have tested the influence of intra-regional characteristics like geography (oil reserves, weather conditions, etc.), culture (mutual trust), institutions, and education (educational attainment) on human capital in more than 1,500 subnational regions in 110 countries.⁴³ Interestingly, the authors found that oil reserves do not explain any significant income variation within or between countries. Quality of institutions, while accounting for 25 percent of inter-country income variation, likewise does not explain intra-country differences in per capita income.

Meanwhile, regional education explained 58 percent of inter-country and almost 40 percent of intra-country variation in per capita income. In other words, of the factors tested, “none come close to education in explaining within-country variation in income per capita.”⁴⁴ The authors concluded that regional education was “a critical determinant of regional development, and the only such determinant that explains a substantial share of regional variation.”⁴⁵

Thus, there is strong evidence of the importance of socio-economic factors for student achievement and for the contention that these factors may vary between regions of a country. The primary focus of the present paper is student achievement in Kazakhstan disaggregated to regional (oblast⁴⁶) level. The data on Kazakhstan's performance in recent large-scale assessments is taken from official international and national reports.

Methodology

To analyze gaps in student achievement between regions of Kazakhstan, I use TIMSS 2015 data.

The choice of TIMSS over PISA is explained, first and foremost, by the structure of the sample: TIMSS includes only school students, whereas PISA (being tied to age) allows college students to be included as well.⁴⁷ Moreover, using TIMSS data makes it possible to follow the methodology of the World Bank's Human Capital Index, which likewise uses TIMSS data to calculate the achievement gap between countries.⁴⁸ Finally, TIMSS is preferable to PISA due to the fact that the latter's 2015 data for Kazakhstan is incomplete.⁴⁹

My particular focus is on South and West Kazakhstan. From the three major international large-scale comparative studies in which Kazakhstan has participated recently (PISA 2015, TIMSS 2015, and PIRLS 2016), it is evident that those regions have demonstrated the lowest student achievement. Moreover, it is possible to see that some oblasts are underperforming across all areas of assessment—both by discipline and by cohort.

Table 3 shows the number of times that different oblasts have been ranked among the three with the lowest performance across all 8 assessment areas: math and science for fourth- and eighth-graders in TIMSS; math, science, and reading for 15-year-olds in PISA; and reading for fourth-graders in PIRLS.

Box 2. Regional Performance in Kazakhstan: Context

Variation in economic performance across Kazakhstani regions is not surprising given the country’s large territory and the uneven distribution of its population. So far, regional performance in Kazakhstan appears to have been fairly understudied.



Below are some of the most recent available data on regional performance and education provided by international and national rankings, along with relevant statistics.

EBRD Regional Capability Index (2015)

One attempt to study the tendencies in regional development in Kazakhstan was made by Whiteshield Partners in 2015 (funded by the EBRD and the Government of Kazakhstan). They used their Regional Capability Index to group

the 16 administrative units of Kazakhstan into “winning,” “stagnating,” and “losing” clusters. The key criteria were economic complexity, diversity, and industrialization in the years leading up to 2014.

Table 1. Regional performance, 2014⁸³

Winning	Stagnating	Losing
Almaty oblast	Almaty city	East Kazakhstan oblast
Zhambyl oblast	Aktobe oblast	South Kazakhstan oblast
North Kazakhstan oblast	Akmola oblast	West Kazakhstan oblast
	Astana city	
	Kostanay oblast	
	Karagandy oblast	
	Pavlodar oblast	

Source: Whiteshield Partners, “Diversification of Kazakhstan’s Economy: A Capability-Based Approach,” EBRD, Astana, 2015, <https://www.ebrd.com/news/2015/new-study-urges-diversification-of-kazakhstan-economy.html>.

Among the main factors influencing regional capability development, the authors cited business barriers and quality of governance, education, and institutions. Despite the fact that Almaty oblast and South Kazakhstan oblast are the two most populated areas and have “comparable economic structure[s],” the authors acknowledge that Almaty oblast is more diversified and thus more open to innovation, while South Kazakhstan specializes in simpler manufacturing.⁸⁴

IAC Ranking of Regional Education Systems (2015-2017)

The Information-Analytic Centre under the Ministry of Education (IAC) publishes an annual National Report on Education ranking the regional educational systems. The ranking provides an aggregated index of regional performance across three levels of education (primary, secondary, and higher). The index groups regional education systems into those with “very high,” “high,” “average,” and “low”

effectiveness. In 2015-2017, none of the oblasts was classified as “very high” in effectiveness. Pavlodar oblast received the accolade of “highly effective” in 2015 and 2016, the only education system to do so, but in 2017 none of the regions made it into that category.⁸⁵

Table 2. Effectiveness of regional education systems index (IAC)

	2015		2016		2017	
	index	rank	index	rank	index	rank
Pavlodar oblast	0.741	1	0.725	1	0.643	2
East KZ oblast	0.68	2	0.602	5	0.572	8
Karagandy oblast	0.654	3	0.608	4	0.579	5
West Kazakhstan oblast	0.642	4	0.651	2	0.576	6
Astana city	0.634	5	0.592	6	0.573	7
North Kazakhstan oblast	0.61	6	0.575	9	0.621	3
Aktobe oblast	0.605	7	0.528	12	0.491	12
Mangystau oblast	0.601	8	0.509	13	0.478	13
Akmola oblast	0.6	9	0.583	8	0.544	9
Almaty city	0.583	10	0.639	3	0.659	1
Zhambyl oblast	0.57	11	0.554	10	0.581	4
Kostanay oblast	0.57	12	0.535	11	0.53	11
Atyrau oblast	0.528	13	0.475	15	0.441	14
Kyzylorda oblast	0.517	14	0.587	7	0.531	10
South Kazakhstan oblast	0.502	15	0.408	16	0.361	16
Almaty oblast	0.485	16	0.639	14	0.432	15

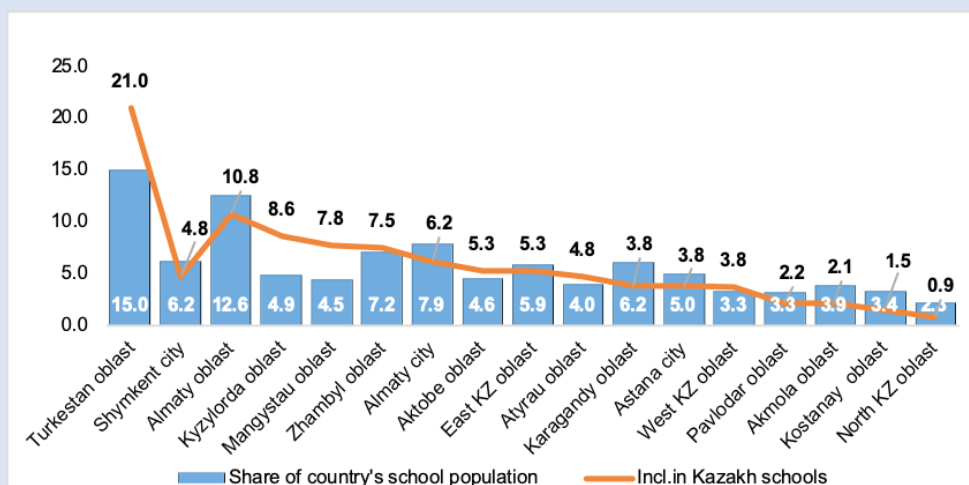
Sources: Information-Analytic Centre, “Natsional’nyi doklad o sostoianii i razvitiu sistemy obrazovaniia Respubliki Kazakhstan po itogam 2015 goda,” Astana, 2016, http://iac.kz/sites/default/files/nd-2016_po_itogam_2015_goda_kratkaya_versiya_rus.yaz._iac_zashchita.pdf; Information-Analytic Centre, “Natsional’nyi doklad o sostoianii i razvitiu sistemy obrazovaniia Respubliki Kazakhstan (za gody Nezavistimosti Kazakhstana),” Astana, 2017, http://iac.kz/sites/default/files/nacdok-2017_ot_kgk_final_09.08.2017_10.00-ilovepdf-compressed.pdf; Information-Analytic Centre, “Natsional’nyi doklad o sostoianii i razvitiu sistemy obrazovaniia Respubliki Kazakhstan po itogam 2017 goda,” Astana, 2018, http://iac.kz/sites/default/files/nacionalnyy_doklad_za_2017_god_s_oblozhkami_dlya_sayta.pdf.

Whereas the regions with education systems that fall into the “average effectiveness” cluster are typically from North, East, and Central Kazakhstan, those with “low” effectiveness are usually from the Southern and Western regions of the country. Kostanay (North) and Akmola (Central) oblasts also fell into the latter group in 2017. South Kazakhstan and Almaty oblasts are continuously ranked as the least effective in terms of education; Atyrau oblast is also usually found in the bottom part of the ranking.

National Statistics

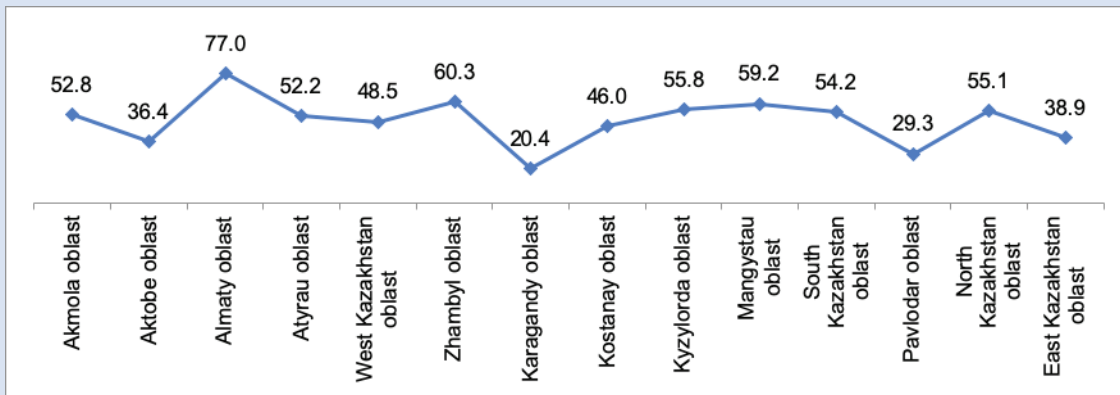
- In 2018, the population of Kazakhstan reached 18 million people. The territorial distribution of the population has always been uneven. The most striking difference is between sparsely populated North and West Kazakhstan and the densely populated South. While Atyrau, Mangystau, Aktobe, and West Kazakhstan oblasts together account for 16 percent of country population, the southern part of Kazakhstan (Almaty, Zhambyl, Kyzylorda, South Kazakhstan oblasts) is home to 37 percent of the population.⁸⁶ South Kazakhstan oblast alone has a population of 2.9 million people, 16 percent of the country’s total, and continues to grow.
- Accordingly, as can be seen from Figure 1, South Kazakhstan accounts for the highest share of the country’s school-age population. Of the country’s over 3 million school students, one-fifth live in Turkestan oblast and Shymkent city (former South Kazakhstan oblast) and a further 13 percent live in Almaty oblast.
- There are clear differences in terms of regional migration. South Kazakhstan region experiences the largest outflows—in Zhambyl oblast in 2016, the negative balance of migration doubled in comparison to 2015 to reach over 16,000 people, and it stood at over 17,000 in 2017. According to the Statistics Committee, the negative outflow in South Kazakhstan oblast reached almost 30,000 people in 2016, while in 2015 and 2017 it totaled around 14,000 people. In contrast, both Astana and Almaty cities showed a positive balance of over 30,000 people in 2017. In the Western region, however, outbound migration is minimal, with Atyrau oblast even showing a positive balance of over 100 people in 2017. Outside of the Southern region, the highest negative balance (close to 14,000 people in 2017) is observed in East Kazakhstan oblast.
- Forty-three percent of Kazakhstanis live in rural areas. The largest share of the rural population is registered in Almaty oblast (77 percent in 2018). The variation in the size of the rural population in recent years is not significant (a decline of two percent in North, West, and East Kazakhstan oblasts compared to 2015, and a four percent increase in Mangystau oblast since 2015).
- In 2017, the average monthly wage in Kazakhstan was KZT 150,827 (approx. US\$454).⁸⁷ Oil-producing Mangystau and Atyrau oblasts show the highest average monthly wage, over 70 percent higher than the national average. Meanwhile, the lowest monthly wage is observed in South Kazakhstan, North Kazakhstan, and Zhambyl oblasts, where it is around 30 percent lower than the national average.

Figure 1. Distribution of school student population across Kazakhstan, 2018



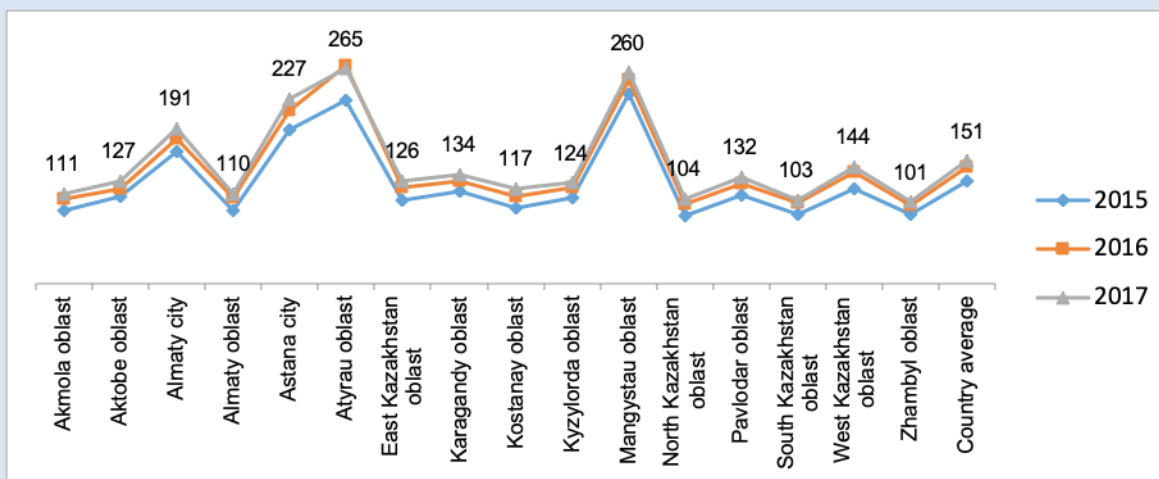
Source: IAC, “Education System Statistics in the Republic of Kazakhstan,” national report, 2019.

Figure 2. Rural population as a share of the regional total (percent), 2018



Source: Statistics Committee, Ministry of National Economy (2019).

Figure 3. Average monthly wage in Kazakhstan (thousand KZT), 2015-2017



Source: Statistics Committee, Ministry of National Economy (2019).

All data on regional student achievement are taken from national reports issued by the Information-Analytic Centre, the national coordinating institution for international large-scale studies. For full student achievement ranking tables for all three studies, see Appendix 1.

It is hard to ignore the fact that regardless of the area of study (science, math, or reading) or the age cohort (fourth-graders, eighth-graders, or 15-year-olds), certain regions tend to

underperform. A striking example is Mangystau oblast, which was among the bottom three regions in seven of eight assessment areas. Students in another oil-producing region, Atyrau oblast, showed the lowest achievement in five assessment areas in all three studies (see table 4).

It would be reasonable to argue that it is inappropriate to draw conclusions about regional educational performance based solely on such a simplistic interpretation of rankings.

The rankings may not fully represent the quality of secondary education; they may also be affected by out-of-school factors. Yet both objections are “features” of my argument rather than “bugs” in it: we need to understand exactly what lies behind regional variations in student achievement before we can treat these test results as indicators of education quality in any particular region.

To be dramatic about it, the role, value, and status of school as an

Table 3. Number of times oblasts were ranked in the bottom three on the eight assessment areas of recent ILSAs

Region	Oblast	Appearance in bottom 6 (times)	Appearance in bottom 3 (times)
West Kazakhstan	West Kazakhstan oblast	1	0
South Kazakhstan	South Kazakhstan oblast	7	4
	Almaty oblast	6	4
West Kazakhstan	Atyrau oblast	8	6
	Mangystau oblast	8	7
North Kazakhstan	Kostanay oblast	6	2
West Kazakhstan	Aktobe oblast	3	0
Central Kazakhstan	Akmola oblast	6	1
Central Kazakhstan	Karagandy oblast	1	0
Central Kazakhstan	Astana city	2	0

Source: Author's compilation on the basis of PISA 2015, TIMSS 2015, PIRLS 2016 national reports, Information-Analytic Centre.

Table 4. Bottom 6 oblasts across eight assessment areas of recent ILSAs

	TIMSS 2015				PISA 2015			PIRLS 2016
	4th-grade science	4th-grade math	8th-grade science	8th-grade math	Science	Reading	Math	Reading
11	West Kaz oblast	Atyrau oblast	South Kaz oblast	Astana city	Kostanay oblast	Akmola oblast	Aktobe oblast	Karagandy oblast
12	Akmola oblast	South Kaz oblast	Kostanay oblast	Akmola oblast	Akmola oblast	Almaty oblast	Mangystau oblast	Astana city
13	Atyrau oblast	Akmola oblast	Aktobe oblast	Almaty oblast	Aktobe oblast	Aktobe oblast	Kostanay oblast	South Kaz oblast
14	South Kaz oblast	Kostanay oblast	Almaty oblast	Kostanay oblast	Mangystau oblast	South Kaz oblast	Akmola oblast	Almaty oblast
15	Almaty oblast	Almaty oblast	Mangystau oblast	Atyrau oblast	South Kaz oblast	Mangystau oblast	South Kaz oblast	Mangystau oblast
16	Mangystau oblast	Mangystau oblast	Atyrau oblast	Mangystau oblast	Atyrau oblast	Atyrau oblast	Atyrau oblast	Atyrau oblast

Sources: Information-Analytic Centre, “Main Results of International Study PISA 2015”, Astana, 2017, http://iac.kz/sites/default/files/nac_otchet_pisa-2015_final.pdf; Information-Analytic Centre, “Kazakhstan’s Results in TIMSS 2015”, Astana, 2017, http://iac.kz/sites/default/files/1_nac_otchet_tims_2015_russ_pdf_o.pdf; Information-Analytic Centre, “Kazakhstan’s Results in PIRLS 2016”, Astana, 2018, <http://iac.kz/ru/events/rezultaty-kazahstana-v-pirls-2016>.

institution is at stake here, especially in regions with low achievement. Can we be sure that test results fairly reflect the amount of work local teachers put in to get a failing student past the threshold? Or perhaps the external factors in a region are so significant that a school’s efforts merely scratch the surface—or worse, are made in vain?

Moreover, the answers to these questions have clear implications for educational policy. Any plans for strategic improvements or systemic interventions should be grounded in certainty that a good initiative will not have uneven regional effects due to varying conditions in the regions.

Figure 4 shows the results of the External Assessment of Learning Achievement (EALA) administered to ninth-graders in 2015. This national standardized test measured students’ knowledge in math and science (physics, biology, geography, and chemistry). The national average

score was 37 out of 80 points.

We can see that students achieved the lowest scores in Mangystau and Atyrau oblasts. In South Kazakhstan and Almaty oblasts, ninth-graders showed achievement close to the national average.

Since the age cohorts tested in TIMSS (eighth-graders) and EALA (ninth-graders), as well as in PISA (15-year-olds) and PIRLS (fourth-graders) are different (although there is a possible overlap between TIMSS, PISA, and EALA), I do not perform correlation analysis between these results.

Calculating Learning-Adjusted Years of Schooling (LAYS) for 16 Regions of Kazakhstan⁵⁰

The Learning-Adjusted Years of Schooling measure was recently developed by the World Bank to assess the quality of education under the Human Capital Index framework. As the authors of

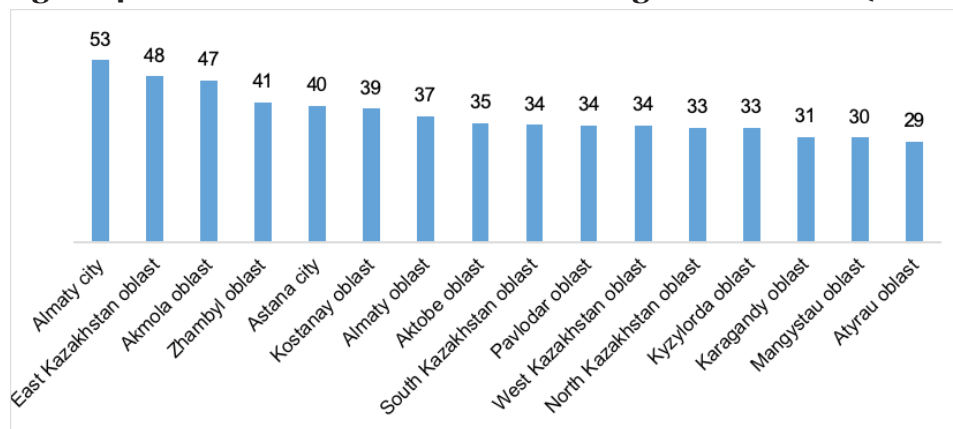
the measure note, the advantage of LAYS is that it reflects both the quantity and the quality of schooling.⁵¹

This approach was originally used to measure differences between countries. In this work, I apply it to calculate the difference in learning-adjusted years of schooling between 16 oblasts in Kazakhstan. As the authors note, “schooling is not the same as learning.”⁵² While educational attainment rates (highest level of education) are still widely used to measure the quality of educational systems, it is also clear that countries (or regions) with the same expected years of schooling are hardly equal in academic achievement. Thus, combining quality and quantity of schooling is an important step toward making assessments of educational systems truer to life.

The overarching formula for LAYS is:

$$LAYS_c = Sc * R n/c$$

Figure 4. External Assessment of Learning Achievement (EALA), 2015⁸⁸



Source: Information-Analytic Centre, “Analiz rezul’tatov vneshnei otsenki uchebnykh dostizhenii uchashchikhsia 9 klassov (VOUD-2015),” Astana, 2015, <http://iac.kz/ru/analytics/analiz-rezultatov-vneshney-ocenki-uchebnykh-dostizheniy-uchashchihsya-9-klassov-voud-2015>.

Box 3. TIMSS 2015 in Kazakhstan

TIMSS 2015 was administered across 57 countries, with over 580,000 students taking part worldwide. The Kazakh sample consisted of 9,579 students, 44 percent of whom were from rural areas.

National analysis revealed that across all regions of Kazakhstan, students in schools where Russian is the language of instruction perform better than their peers who study in Kazakh. Rural students significantly lag behind their urban peers, while boys and girls show nearly similar achievement levels. The highest gap in average TIMSS scores is observed between the eighth-graders instructed in Russian and Kazakh, respectively, in Atyrau oblast, with the latter lagging over 120 points behind the former in math and science.

Children whose parents have higher education score significantly higher than those whose parents have only secondary or vocational education. Similarly, if a child attended preschool education facilities for 3 years of more, his/her scores are higher than those of students who attended for less than 3 years.⁸⁹

where S_c is equal to average years of schooling in country c and $R_{n/c}$ is the measure of average learning for the relevant cohort and country relative to a benchmark country.⁵³

For the purposes of my work, I use region-level data instead of country-level data and take Almaty city as a benchmark region, since it has the highest scores in all areas but one. I provide a detailed explanation of the World Bank's formula and my adjustments in the Appendix.

Limitations

It is important to mention two possibly significant limitations relating to the calculation of LAYS in this work. First of all, since LAYS was originally designed to calculate country-level results, there is a possibility of significant standard error when comparing region-level data, which could affect the final calculations.

Broader concerns relate to the extent to which student achievement as reported by large-scale studies can represent both in-school processes and a student's family context. In other words, do these tests measure actual quality of learning/schooling in a particular school? While there is no ultimate answer to this question, as school effectiveness is a constantly developing movement in education science, I refer to the multiple previous studies that have employed PISA and TIMSS data as the most complete information dataset on countries' educational performance to date.

In the Kazakhstani context in particular, there are some concerns about the extent to which test tasks reflect the local school curriculum. However, these are not particularly troublesome. According to the national coordinating institution (Information-Analytic Center),

TIMSS is more focused on assessing students' academic knowledge of the curriculum than on determining their ability to apply it in real-life situations (as the OECD's PISA does). Thus, given the strong traditions of science and math teaching that are still present in Kazakh secondary schools, TIMSS data seem to reflect the Kazakh curriculum even more than does PISA.⁵⁴

Expert Survey

To gain a better understanding of the scope of factors affecting student achievement in regions, I conducted a survey of experts. The aim of the survey was twofold: a) to understand the level of general awareness of regional disparities in student achievement; and b) to get a pool of professional opinions on what factors underpin low academic achievement in Kazakhstan's regions.

The expert sample consisted of 16 respondents specializing in education (10) and other professional spheres (6).

Data and Results

LAYS Calculation Results

Table 5 displays the results of LAYS calculations. These are presented by TIMSS discipline (science, math) and cohort tested (fourth- and eighth-graders). The first column shows each region's test score, while the LAYS column shows years of schooling adjusted for the "quality" of learning.

Almaty city receives a score of 11

in every LAYS column, as it acts as a benchmarking (numeraire) region. However, it is also three years behind the expected 14 years of schooling for the country.⁵⁵ The calculations presented in Table 6 are made with an assumption that learning starts in kindergarten, leading to three years of learning in preprimary education and 4/8 years in

school. Calculations on the assumption that learning starts at school (first grade) can be found in Appendix 1.

As can be observed from the table, the regions closest to Almaty city on the LAYS measure are Kyzylorda oblast (which even outperforms Almaty city on eighth-grade math), Zhambyl oblast,

and East Kazakhstan oblast. The gap in learning-adjusted years of schooling between these regions and Almaty city is around half a year.

Thus, not the entire South Kazakhstan region lags significantly behind in academic achievement. However, Almaty oblast is more than 2 years

Table 5. Sample of experts

	E1*	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	E15	E16
Gender, age	M, 56	F, 55	F, 26	F, 42	F, 70	M, 32	M, 50	M, 34	M, 35	M, 36	M, 29	F, 27	M, 34	M, 58	F, 36	M, 32

*E1, E2, etc.—Expert 1, expert 2, etc.

Source: Compiled by the author on the basis of expert sample.

Table 6. Learning-adjusted years of schooling (LAYS) for regions of Kazakhstan

	TIMSS score 4 th grade, science	LAYS	TIMSS score 4 th grade, math	LAYS	TIMSS score 8 th grade, science	LAYS	TIMSS score 8 th grade, math	LAYS
Almaty city	623	11	608	11	591	11	575	11
East Kazakhstan	588	10.2	582	10.4	574	10.6	560	10.6
Zhambyl	581	10.1	582	10.4	580	10.7	573	11.0
Kyzylorda	582	10.1	582	10.4	570	10.5	581	11.1
Pavlodar	573	9.9	561	9.9	556	10.2	544	10.2
North Kazakhstan	554	9.4	549	9.6	554	10.1	523	9.7
Aktobe	557	9.5	548	9.6	511	9.1	530	9.9
Karagandy	547	9.3	540	9.4	529	9.5	522	9.7
Astana city	544	9.2	536	9.3	530	9.6	515	9.5
West Kazakhstan	544	9.2	535	9.3	525	9.4	519	9.6
Atyrau	536	9.0	533	9.3	471	8.2	478	8.6
South Kazakhstan	530	8.9	533	9.3	522	9.4	522	9.7
Akmola	538	9.1	529	9.2	528	9.5	511	9.4
Kostanay	549	9.3	523	9.0	516	9.2	494	9.0
Almaty	519	8.7	511	8.8	507	9.0	504	9.3
Mangystau	504	8.3	508	8.7	473	8.2	476	8.6

Source: Author's calculation on the basis of TIMSS-2015 data for Kazakhstan.

behind Almaty city. This means that in 11 years of school, students there only cover knowledge equal to around 9 years in the schools of Almaty city. From the map above, we can also observe that Mangystau oblast, technically classified as a western region (it is also similar to Atyrau oblast in its oil-production economy), is geographically closer to the southern region of Kazakhstan. This fact was previously mentioned by Alimkhanova in her analysis of the NEET situation in South Kazakhstan.⁵⁶

The results for West Kazakhstan as a whole are more homogeneous than those for the South. We can observe that both Atyrau and Mangystau oblasts are more than two years behind Almaty city in academic achievement. In their eleven years at school, eighth-graders in Atyrau and Mangystau oblasts are projected to cover an amount of learning equal to just 8-8.5 years in an Almaty city school (there is an almost three-year gap in science). For West Kazakhstan oblast, LAYS varies from 9.4 years in science to 9.6 in math, thus showing an approximate 1.5-year difference from Almaty city. Aktoobe oblast is almost 2 years behind Almaty city in science and 1 year behind in math.

Another pattern worth mentioning can be seen across the Central Kazakhstan region. Karagandy and Akmolala oblasts, as well as the capital city, Astana (Nur-Sultan), all lag 1.5 years behind Almaty city in achievement.

Figure 5 shows the results of LAYS calculations for eighth-graders' math scores, with learning starting at Grade 0 and Grade -3. This approach to calculation is offered by Filmer et al. to compare adjusted learning outcomes for different assumptions on when the learning starts—either at Grade 0 of school or 3 years before that, when a child goes to kindergarten.⁵⁷ The numeraire region is Almaty city and the correlation between the two measures is 1.

Predictably, there is also a strong correlation between LAYS for different subject areas (science and math)—0.93 for eighth-grade scores.

Expert Survey Results

The ultimate goal of the expert survey was to serve as preliminary grounds for a larger study on the reasons for educational underperformance

in regions, providing a broad range of answers to exploratory questions and helping to develop an informed hypothesis.

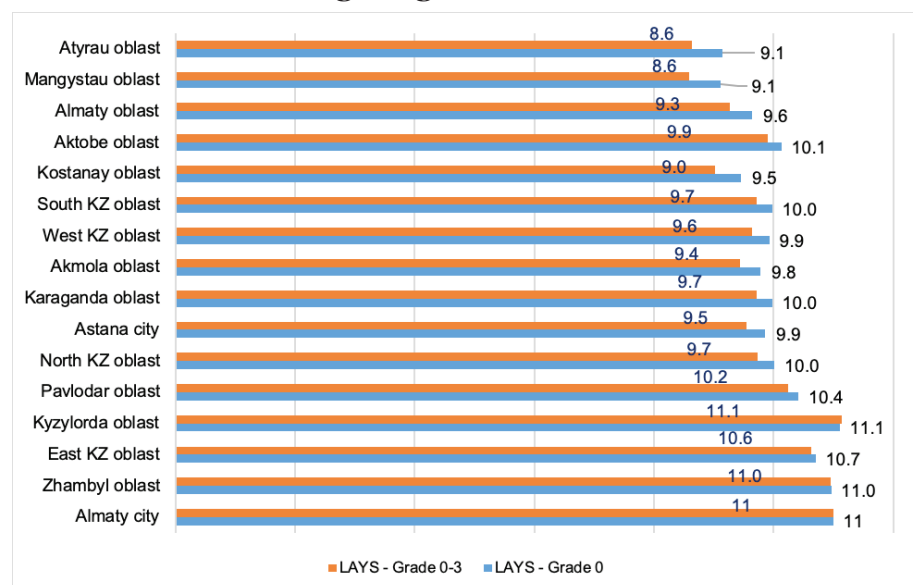
Survey questions were clustered into three major subgroups: level of awareness; reasons for regional underperformance in secondary education; and what can be done to shift the situation.

- Public awareness (is there a problem?)

Q1. What do you think about the quality of secondary education in Kazakhstan (as shown by student achievement, final grades, project work, academic contests)?

Six of the experts surveyed consider secondary education to be of either low or “below average” quality in general. Some of their criticisms relate to the perceived overall “elitism” of secondary education, where a lot of attention is given to catering to talented and/or well-off students rather than to

Figure 5. LAYS for regions of Kazakhstan (eighth-grade math)



Source: Author's calculation on the basis of TIMSS 2015 data for Kazakhstan.

underperforming students. Other experts pointed to specific problems: a disparity in educational outcomes between urban and rural schools, regional differences, and a big gap in achievement between gifted and struggling students.

E5: “Kazakhstan’s education system is like a big field with built-in ‘quality islands’ resulting, I think, from the education ‘elitization’ politics realized throughout the past decades.”

E13: “...There’s too much focus on ‘gifted’ kids, while no work is being done with underperforming or struggling children.”

E11: “There are schools that offer world-class education and schools where kids do not learn even basic skills.”

Only two respondents consider secondary education to be of “good quality” or to have made significant progress in recent years. These respondents also mentioned the development of institutions for gifted children in support of their argument, as well as increased financial support for the system as a whole.

E14: “I think the quality of secondary education is rising. It is connected with 100-percent school enrollment, good-quality preschool preparation, parental involvement, and increased social activism, as well as the work of the state government to strengthen the quality of education and the work of Nazarbayev Intellectual schools⁵⁸.”

Overall, among the majority of the

experts there is a clear consensus that the quality of education cannot be generalized at national level due to the heterogeneity of the schools in the system and their varying prerequisites.

Q2. What else do you think can serve as an indicator of the quality of education?

Experts mentioned functional literacy (the ability to communicate and work with various types of information, the ability to apply knowledge to real life) and university enrollment/competitiveness of graduates as the most important indicators. Equality of opportunity and inclusiveness was the second most frequently mentioned indicator, while only two experts mentioned parent, student, and teacher satisfaction as evidence of the system’s quality.

E14: “... We need to focus not so much on the current numerical indicators, but rather on quality indicators, as well as on the range of indirect impact factors (economic, demographic, sociological) that accompany the sphere [of education].”

E5: “The indicators mentioned here (academic achievements, participation in school Olympiads and contests) are ‘classic’ indicators used to make educational rankings by educational systems that still function in the ‘knowledge paradigm.’ If a system of education aims to facilitate students’ acquisition of a broad range of competencies, the indicators will be broader as well—like students’ ability to make decisions, teamwork skills,

communication skills, etc. In other words, the range of indicators of the quality of education is directly or indirectly connected with the conceptual platform of the national system of education.”

E1: “Skills of working with information: find it, analyze it, and make conclusions.”

E9: “The main indicator is the share of graduates enrolled in the world’s top universities.”

E13: “One of the key indicators of educational quality is reducing the gap in achievement between struggling and successful students.”

Q4. How well, in your opinion, is Kazakhstani society informed about the achievements or limitations of achievements of the secondary education system? What do you yourself know about its key development indicators?

Experts held similar views regarding the level of social awareness of the achievements and pitfalls of the country’s secondary education system. The majority believe that society is either completely unaware of or insufficiently informed about recent developments in secondary education.

E6: “On average, society does not know anything. [Those on] Facebook know a set of populist facts, analysts might know about PISA, etc.”

E4: “Society is not sufficiently aware. The secondary education system in Kazakhstan functions according to a top-down ap-

proach, which does not always contribute to developing teachers' initiative and their readiness to changes. That is why the key indicator of the system's improvement is their inclusion as experts in the process of developing textbooks, curricula, and assessment systems, which should contribute to teachers' professional development."

E3: *"The general public in Kazakhstan mostly knows about the successes and failures of the system of secondary education from their own or their community's personal experience. The nationwide PR policy on education requires improvement."*

E10: *"I think the public is not sufficiently informed about the state system of secondary education in Kazakhstan. On the one hand, this could be due to a lack of interest on the part of the people themselves, except those directly involved in the educational process (teachers, managers, students and their parents, state institutions). On the other hand, much is underpinned by a lack of systematic communication from the schools and the state. The only key indicator of the development of secondary education system of which I am aware is the UNT."⁵⁹*

E12: *"They [the public] are completely unaware. We need an effective communications campaign, although it is still not in the interests of the state apparatus to shed light on the real issues at hand."*

After the first segment of five broad questions, experts were

offered the chance to look at the results of three large-scale comparative studies (TIMSS, PISA, PIRLS) and asked whether they could draw any conclusions from that information.

Q5. Is it possible, in your opinion, to trace the quality of schooling in specific regions based on these results?

Overall, there is a high level of trust in LSAs among the experts surveyed. Twelve of 16 experts believe they can be used as reliable sources of information about the quality of secondary education. Among the four who answered this question in the negative, two referred to the need to integrate the data into a larger analysis with additional data in terms of the quantity of observations and other indicators such as university enrollment data. Two experts disregarded the international test results completely, expressing their distrust in the integrity of the data and the administration of the tests in Kazakhstan in gen-

eral.

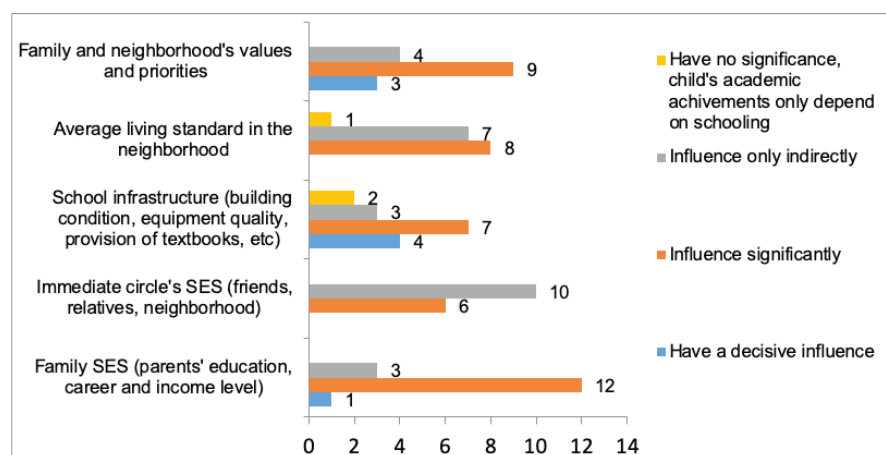
On the other hand, as mentioned by one of the experts, since the methodology of a particular test is the same for all the regions, it provides a good starting point for further analysis, showing that particular regions have lower results across all three studies.

o *Reasons for regional under-performance*

Q3. How important are background (contextual) factors in determining a child's academic achievement? (multiple choice)

Before addressing specific regional underperformance, the experts were asked to answer a multiple-choice question regarding the influence of contextual factors (as opposed to features of schooling, happenings in school) on a child's academic achievement. As can be seen from Figure 6, the majority believe that family SES and the values system with which children are raised play a

Figure 6. Role of contextual factors in determining academic achievement



Source: Compiled by the author on the basis of expert survey responses.

significant role in their academic success. Living standards in their neighborhood and school infrastructure come second in terms of their influence on academic achievement.

Q5. What key factors, in your opinion, might influence the quality of secondary education in a region?

Q6. In your opinion, can internal regional characteristics impact underperformance [in secondary education]?

It is possible to identify four main factors that the experts consider to be the most influential in determining regional educational achievement:

- Regional SES (including the share of urban/rural population, education expenditure, school financing, and the poverty level in the region/neighborhood);
- Quality of teaching (teachers' qualifications and professional development opportunities);
- Language (Kazakh versus Russian languages of instruction, share of Kazakh-speaking population in the region); and
- Values and traditions of local population (importance of education in regional strategic development, traditions and local views regarding the value of education)

E6: "If it is a mining/trading or an agriculture-oriented region, it is no place for intellectual teachers. Moreover, the average parent would be engaged in non-intellectual work. It is challenging to achieve a high quality of education in such conditions."

E3: "The gap in achievement might be due to intraregional characteristics. It is important, for example, what type of production the region specializes in."

E5: "South Kazakhstan oblast is peculiar due to its high density of school students from various backgrounds; the population has a more traditional value system in which education might occupy a firm position but not be a first priority."

E6: "...However sad or shameful it is to acknowledge this fact, [regional underperformance] might also be connected with the share of Russian-speaking population in the region, although this should change with time."

E11: "In Mangystau and Atyrau oblasts, [low educational achievement] might be due to the outflow of human capital from teaching to higher-paid professions. Moreover, along with South Kazakhstan oblast, these regions are more Kazakh-speaking and it is no secret that instruction in Kazakh is not the same quality as instruction in Russian or English, which means low-quality textbooks and lower-quality teachers."

E9: "I think the results will correlate with the urban/rural population ratio. The results of urban students will always be higher than those of their rural peers, so it is not quite right to compare the city of Almaty and Mangystau oblast."

E14: "The fact that particular regions are lagging behind might

depend on the urban/rural population ratio, living standards in the region, ecology, and traditions."

- Character of change required

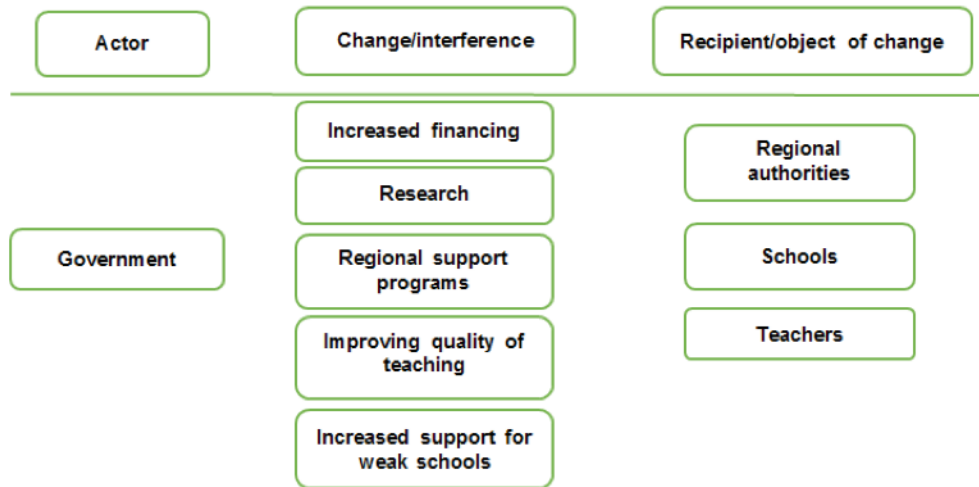
Q9. What could be done (in both the short and long term) to shift the situation of failure (both regionally and nationwide)?

It is possible to disaggregate expert opinions here into several categories that emerged during the analysis: a) actor (who should author the change); b) character of change (type of interference required); and c) object of influence (what or whom the change should address). The measures suggested by the experts to reduce inequality in access to quality education ranged from additional funding to changing the structure of education system management at both national and regional level.

Actor

As was to be expected, all experts link any potential change to the central government, represented by the Ministry of Education and other decision-making bodies. This is a fair perception in a centralized system, where decisions involving finance, infrastructure and capacity-building are normally made only by higher authorities. This is also mostly true for region-level activities, especially in the field of education—regional activities in this sphere are planned on the basis of the State Program for Education Development, which states national and regional priorities.

Figure 7. Actor, change, and object of change proposed by experts



Source: Compiled by the author on the basis of expert survey responses.

Type of Change

The most important and urgent measure, in experts’ opinion, is to increase financial support for the education system in general, as well as for the regions. That includes raising teachers’ salaries and targeting financial aid to weak schools in disadvantaged neighborhoods.

E2: “... regional support programs, targeted support for weak schools and struggling children.”

E1: “Increased financial support, including for poverty alleviation, increased salaries for teachers.”

E12: “Increase per capita funding, give [schools] autonomy.”

There is a consensus among the majority of experts that measures to reduce the achievement gap should originate from within the region, based on the regional context and issues at hand. Two experts mentioned the need for research to understand the reasons for regions’ poor performance

prior to enacting new measures.

E2: “Support programs for weaker regions, targeted support for ineffective schools and struggling children.”

E3: “Before introducing any measures, we need to conduct deep research into the reasons for regional inequality in education. And after the reasons are clear, specific regional measures can be initiated.”

E8: “I think we need a specific regional policy to reduce the disparity in the quality of education. Perhaps we need a special salary bonus for teachers in the western region, where the average salary [for teachers] is much less than the region’s average wage.”

E9: “I suggest 1) delegating the prerogative of school financing and teacher salaries to the local authority level; 2) that the Ministry of Education should concentrate only on coordination of and methodological support for the schooling process; and 3) getting

rid of the archaic secondary education management scheme (district/city/oblast authorities), as they pose a corruption risk and are of no use.”

E13: “On a regional level, [we should prioritize] 1) developing infrastructure; 2) improving teacher quality; and 3) adopting targeted regional programs with increased financing. Nationwide, there is a need for a support program for disadvantaged children and schools.”

E15: “There is a need for a deep analysis of the issues underpinning quality of education (impact factors) and possible solutions.”

Improvement of teacher quality and status is another step that was often mentioned by the experts, who are alarmed by the poor quality of future teachers admitted to training programs at universities and the lack of teacher autonomy in Kazakhstan. Some experts view improving the status of teachers as a vital part of the overall improvement of

the quality of education in the regions.

E10: “[We need] a higher level of teachers (financial stimuli, better preparation and more rigorous selection by pedagogical programs, focus on attracting professionals without teaching experience but with appropriate practical expertise.”

E4: “Continuous improvement of teachers’ professional excellence, focused not on their formal qualifications but on improvement of their practice; establishing teaching as a profession rather than a semi-profession.”

E11: “Improving teachers’ status, reducing administrative workload, and motivating them to engage in continuous (!) capacity-building, including rural teachers.”

It was also suggested to facilitate the development of private schools and to roll back the educational reforms launched in the past five years, including trilingual education, which are seen as possibly too big a burden on schools and teachers in particular. It is worth mentioning that there are certain indications of dissatisfaction with the curriculum and textbooks—one expert suggested replacing national textbooks with foreign editions, while another believes that the whole “Kazakhstani” model of secondary education is ineffective, suggesting that the example of developed countries should be followed instead.

E7: “[We need to] give up the idea of building a specifically

‘Kazakhstani’ model of secondary schools. It is sufficient to analyze the models implemented in developed countries (like the USA, Finland, Russia, etc.) and copy one of them. I insist—just copy as it is, and do not change even 0.01 percent of its content.”

Object of Change/Influence

As for “what has to change,” there are several areas which, in the experts’ opinion, should be targeted to improve the quality of education both nationwide and regionally. As mentioned before, the quality of teachers is associated with the quality of education, which is why there are a number of recommendations relating to providing support for their continuous professional development and rethinking the enrollment policies of university teacher-training programs.

However, qualifications are not the only issue. Teachers’ low wages were frequently mentioned as the main limiting factor. Teachers’ welfare is likewise cited as an important condition for the holistic educational process and is associated with both compensation and the status of the profession.

Experts express their concern about the top-down school management system, arguing that schools need more autonomy to be able to improve. An increase in the number of schools financed through per capita funding is also seen as a necessary step toward building a more sustainable school environment. Certain concerns and criticisms addressed the work of the regional educational authorities, including dis-

trust in the transparency of their decision-making. Finally, there is skepticism about the recent reforms in secondary education, including trilingual education and the renewed curriculum, with some experts suggesting that they are having a detrimental effect on the quality of secondary education as a whole.

Discussion

“It is certainly true that schooling should be easier to influence than family, peer, or broader social and economic trends, but this does not invalidate their influence.”

—Mortimore and Witty (1998, p. 300)

Certain regions of Kazakhstan are clearly underperforming in secondary education, as can be seen from the results of the international large-scale assessments and the calculation of learning-adjusted years of schooling (LAYS).

According to the LAYS calculation, by the time they graduate from school, current fourth- and eighth-graders in Almaty and Mangystau oblasts will only have acquired knowledge equivalent to 8.5 years of schooling (out of an expected 14 in preschool and school). Even bearing in mind the possible limitations of such calculations (eg., the extent to which test results represent the actual learning happening in the classroom), this seems unacceptable in a state that is determined to provide every child with equal educational opportunities and equal quality of education.

Understanding what lies behind such drastic differences in academic achievement is vital for planning any interventions to change the situation for the better. As mentioned above, much of academic achievement is explained by contextual factors, some of which were highlighted during the expert survey.

According to respondents, a family's socioeconomic status, quality of teachers, a family's values, and language of instruction at school all have a direct influence on the quality of education available to students in Kazakhstan. Yet it appears that most of these factors are not accounted for in educational planning at regional or national level, for a variety of reasons: lack of relevant data, the area being out of the reach of educational authorities, etc.

Mortimore and Witty's rhetorical question "Should we ignore disadvantage in the hope that students themselves will find the necessary strengths to overcome their problems?"⁶⁰ sums up the gist of the practical and ethical controversies around the issue. It is my belief, however, that (at least in the case of Kazakhstan) a large share of the contextual or other factors standing in the way of a child's academic achievement can be, if not eliminated, then compensated for. To bring this about, we need political will and a holistic strategy.

The main problem with the current policy on the issue of regional academic underperformance is that there is virtually none. At least, there is no policy specifically

aimed at reducing educational inequality across regions based on an understanding of the key impact factors. The two strategic documents outlining educational policies and regional development priorities in Kazakhstan, as well as regional education development strategies, hardly take into account regions' socioeconomic context or local conditions.

For example, the State Program for Education Development (SPED) outlines strategic goals for the education system as a whole, aiming mainly at achieving numerical indicators. The State Program for Regional Development (SPRD),⁶¹ in turn, refers to the SPED on all indicators concerning education. Regional education development strategies, too, are normally drafted in accordance with and on the basis of SPED goals and indicators.

Under such a unified approach to education development, it is not surprising that regions experience varying effects from the government's well-intentioned national initiatives. While regional inequality in education is continuously brought to attention in national reports and national analyses of TIMSS and PISA results, there is still no specific strategy or action plan in place to reduce it. In short, Kazakhstan's education system "does not act as a social lift but rather increases social inequality."⁶²

E6: "For a child, [low educational achievement in a region] means zero opportunities in terms of employment and career;

for the region, it is not so scary, since it is possible to make it attractive to qualified employees/the educated population using administrative resources. However, that requires [political] will and resources. Nevertheless, in a stagnating situation, the low quality of education means the continuing growth of poverty in the region and out-migration."

E8: "Consequences manifest in lower chances for children to win a higher education grant and to compete in the labor market."

E14: "The basic consequence of low-quality education in a region is, in my view, out-migration—from rural to urban areas and from struggling regions to more well-off ones, like Nur-Sultan, Almaty, and Karaganda cities. Thus, the gap in education quality is ever increasing."

E5: "The main consequence is an unfair narrowing of the opportunities for sustainable development available to children and youth, which in the end results in various negative social phenomena like poverty, asocial behavior, etc."

Besides the legitimate concerns about out-migration in the south of the country, there is another issue—the rising number of NEET youth (those not in education, employment, or training). The share of NEET youth in Mangystau oblast is already 16 percent, and in South Kazakhstan oblast it is 10 percent.⁶³ As a rule, this number is higher in rural areas, indicating young people's lack of interest in entering higher education or the

job market—or their inability to do so. As Alimkhanova mentions, NEET youth mostly come from disadvantaged families and demonstrate low academic achievement.⁶⁴ The implications of such youth disengagement are multiple, including increasing prospects of social tension in the regions and the issue of return on educational investment.

The perceived marginalization of Kazakhs born in the Western and Southern regions is evident, perhaps now more than ever. As Koch and White's study shows, the "southerners," in particular, are perceived by other Kazakhstanis as "aggressive," "uncivilized," and "unintelligent," with a certain level of social resentment coming from the "urban" population of bigger cities in Central and North Kazakhstan.⁶⁵

Moreover, as Koch and White find, Kazakhstani citizens consider southern and western regions the "least desirable" to live in, with economic opportunity cited as the most important reason for this. There is a common public perception that people from South Kazakhstan are corrupt.

In a country of inherent controversies, among which language and the opposition between traditional modern mindsets are some of the most apparent, the signs of such alarming social segregation cannot be underestimated. It is imperative to take measures so that children do not become hostages of the socio-economic or cultural issues of their neighborhoods.

Both the underpopulated oil-producing Atyrau and Mangystau oblasts, with the highest average salary and share of the country's GDP, as well as the densely populated and poor South Kazakhstan region (classified by Whiteshield Partners and EBRD in 2015 as "losing"), demonstrate staggering underperformance in education, a fact that calls for specific attention. If nothing else, this could mean that besides local educational institutions themselves, there are other major factors influencing the effectiveness of regional secondary education systems and that these factors may vary from region to region. Among these, one might, as experts have indicated, list language, the local values system, and the socioeconomic situation.

Language and Values as Determinants of Academic Achievement?

There is clear evidence that in schools with Kazakh as the language of instruction, as well as in rural schools (and especially when these two overlap), students continue to show much lower achievement.

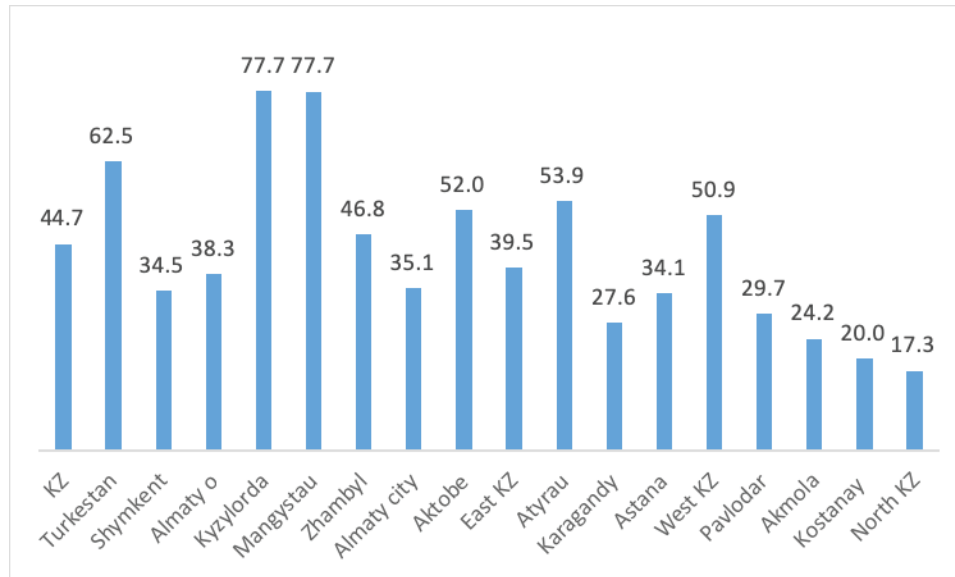
However, it may be argued that strategic planning in regions does not control for poorer education in these schools. Regional strategic plans, for example, might only include generalized "measures to improve quality of education" and do not stipulate financial advantages or additional funds for poorer schools or Kazakh-language schools (which often overlap). The former South

Kazakhstan oblast (now divided into Turkestan oblast and the city of Shymkent), for example, had the lowest expenses per student in 2015.

There is an intrinsic assumption that all policies and initiatives should work the same across all mainstream schools in Kazakhstan. However, a drastic difference in academic performance between Kazakh- and Russian-language schools persists. Thus, the effect of any well-intentioned initiative (like trilingual education) is likely to be minimal in Kazakh-language schools, with students receiving less benefit in the end.

In 2018, 53 percent of all schools in Kazakhstan taught solely in Kazakh, accounting for 40 percent of the total school student population (1.3 million students).⁶⁶ The distribution of Kazakh schools across the country reflects the density of the native language-speaking population. In Mangystau oblast, 86 percent of schools teach in Kazakh; in Kyzylorda oblast, another southern region, the figure is 89 percent. In the former South Kazakhstan oblast, there are over 1,000 Kazakh schools, comprising 72 percent of all regional schools and one-fifth of all Kazakh schools in the country. Kazakh schools represent a clear majority in the west too, with such schools comprising over 65 percent of the total in Aktobe, Atyrau, and West Kazakhstan oblasts. South and West Kazakhstan account for the largest share of the country's student population studying in Kazakh.

Figure 8. Share of students in Kazakh-language schools (of total regional school population)



Source: IAC, “Education System Statistics in Republic of Kazakhstan,” national report, 2018.

The language-related disparity in academic achievement is somewhat unique to Kazakhstan and reflects national history. First of all, it is not speakers of the second or foreign language who are lagging behind but those of the state language—the language of the ethnic majority. Also, as has been demonstrated by international assessments, bilinguals (those who speak both Kazakh and Russian at home) score higher than their monolingual peers.

Undoubtedly, the lower quality of education in Kazakh schools is due in part to the Soviet legacy of suppressing national languages and identities, a policy the effects of which are perhaps more vivid in Kazakhstan than in any other post-Soviet state. To this day, Kazakh-language university faculties experience a lack of relevant materials, poorer labs, and lower-quality teaching staff.⁶⁷

However, there are several

examples showing that, given the right resources and curriculum, either language can be turned to students’ advantage. The experience of the Nazarbayev Intellectual schools and Kazakh-Turkish Lyceums, which practice trilingual education, has proved that it is possible to create learning environments in which place of origin or first language do not impact academic achievement, but even become a student’s strengths. The graduates of these institutions are the most competitive in the country, often being accepted to top international universities even before graduation.

The problem is with the country’s mainstream schools, which are typically underfunded in overpopulated areas and struggle to attract the best university graduates if—like 75 percent of the country’s schools—they are in rural areas.

The impact of values, traditions, and priorities on academic achievement is fairly understudied and is even harder to measure and correlate with performance than the language factor.

In Kazakhstan’s educational development programs, the closest proxy for values is the indicator of “satisfaction with educational reforms and policies/quality of education.” It is one of the target numbers that is set to improve every year.⁶⁸ This indicator is isolated and probably not a good reflection of all education policies and the overall quality of education. Yet it is fair to argue that satisfaction can and will appear only after the local population sees an improvement in the quality of education in their neighborhoods. Arguably, improvements in Astana (Nur-Sultan), Almaty, or Shymkent cities will not prove particularly comforting for a parent in newly

established Turkestan oblast⁶⁹ whose child studies in a class with forty classmates.

Values play an important role in understanding the quality of secondary education for girls. Women are an important part of the country's human capital. Several international studies and reports highlight the importance of quality education for women—both in terms of return on investment and in terms of social and cultural capital. Thus, making sure that every girl has a chance to get a higher education or otherwise earn a professional qualification enabling her to enter the labor market and further develop her abilities is extremely important for the nation. Not only does investment in women bring greater returns in the future,⁷⁰ but women also transmit their potential and values to their children, both directly and through the subtle transmission of social and cultural preferences.⁷¹

Though almost 100 percent of school-age boys and girls are enrolled in secondary education in Kazakhstan, what happens to girls after school is an important factor as well.

Both South and West Kazakhstan are known for a tradition of “bride theft,” which often happens against a young woman's wishes, often leading to tragic consequences.⁷² These regions also feature frequent cases of early marriage. Women are often seen only as housewives and take no part in education or work. This is a direct result of the

low value placed on education for women by local people, as well as of the lack of awareness of basic human rights statutes and policies. This also speaks to the need for specific programs at schools to educate both boys and girls about the immorality and illegality of bride theft, as well as to teach girls to raise their voices and advocate for themselves. Ignoring the poor quality of education in these regions would result in, among other things, a further deterioration of human rights.

The values system of the population is not something that exists in isolation. As Wilson notes, particularly for school-aged children, the value of getting higher education or graduating from school might depend on the benefits associated with it.⁷³ Thus, we circle back to the socioeconomic situation in which a child finds him- or herself—the amount and quality of educational resources available to him/her and the career opportunities they associate with secondary or higher education.

Disbelief in being able to succeed in life when “living by the rules” may lead to conscious disengagement from education. This is especially likely to be the case in the atmosphere of failure that inevitably forms around a schoolchild in a disadvantaged area. One example of this is the rising NEET phenomenon in South Kazakhstan.

SES of the Region and Family

Socioeconomic status, as

represented by parents' income and education and child's access to educational resources, is perhaps the trickiest impact factor to address from an educational perspective. As arguably the most influential factor in predicting a child's academic success, it therefore puts increased responsibility on schools in disadvantaged neighborhoods. These schools have to compensate for poorer educational opportunities and the family issues that a child often experiences at home. At the same time, they struggle to meet the national criteria prescribed by the unified national education development program and regional strategies.

Thus, we find a situation “where schooling may not automatically transform into human capital because of poor educational institutions, nor be channeled into productive use due to lack of institutional efficiency in the economy.”⁷⁴

“Quality” of education depends on a variety of “schooling” factors, including instruction, curriculum, teachers, school infrastructure, school governance, and the quality of management of the local educational authority. As both literature analysis and expert surveys show, other factors outside the school—like family SES and priorities—have a major impact on learning. Therefore, it seems that there is an inevitable policy dichotomy when it comes to raising a resilient, economically active, moral citizen.

While efforts in the education

field might be focused on a student's IQ and EQ, the lack of complementary actions or policy implementation failures in other spheres (national economy, social development, health, etc.) puts educators in a difficult position.

First of all, there is increased responsibility. As schools "deal" with citizens for a longer period of time than any other single institution, society perceives them as responsible for students' "holistic development." This narrative is omnipresent in both official and media publications in Kazakhstan, where school is positioned as a major agent in the "formation of a citizen."

And then there is an unseen obligation to compensate for those other institutions and policies that fail to do their part in this very holistic development, the ones responsible for dealing with the issues of families with low SES, single mothers, families with children with special educational needs, etc., as well as the lack of sports and cultural institutions in rural areas.

So when the other policy or economy spheres do not keep up, schools in disadvantaged areas are in a tricky, no-win situation. That is why we have devoted teachers with high anxiety levels and young teachers not willing to even start work after graduating from universities.⁷⁵

What if the school is a weak one itself? As the data show, weak schools appear mostly in economically disadvantaged, rural, Kazakh-speaking communities. And if the quality of teaching is one of the most

important factors in determining academic achievement, it is no surprise that weaker schools tend not to attract the best university graduates. Moreover, employment policies are vague at best: because very few young people decide to commit themselves to teaching in rural schools, the latter often employ TVET (vocational education) and school graduates.

In such a closed "vicious circle" environment, a school might fail to do its own part in forming an economically active individual—making it impossible for it to compensate for the shortcomings of other spheres.

Now, if one assumes there is a large concentration of such schools in a particular place that are failing not only to compensate for other institutions but even to fulfill the school's own duties, that would have a detrimental effect on the whole human capital potential of that region and its citizens. Education, and specifically secondary education, is the foundation of one's future success. A failure to provide it seriously undermines not only a student's personal happiness and professional fulfillment, but also the country's future economic welfare. That may seem too straightforward, yet often we fail to see this bigger picture—and to remember that even in the case of a bad school, its being bad is not the primary problem.

Conclusion and Recommendations

It is evident that the socioeconomic background of a family influences a child's

academic achievement and his or her future life prospects. In turn, the neighborhood and success or failure of a child's elders might also impact his/her educational choices, affecting his/her utility-maximizing perspective on education.

There is also evidence that, vice versa, education is the single most important factor influencing regional economic performance. As the literature indicates, in line with my survey results, there are also other impact factors that might significantly impact average regional student achievement. These factors are rooted in each region and may vary from one to another.

Some of these impact factors are unique to the Kazakh context and need to be thoroughly studied. Understanding the causes of things is a key condition for planning effective change. Thus, it seems so far that it is vital to understand a) which impact factors are the prerogative of the main responsible governmental institutions—the Ministry of Education and regional authorities—and which are not; and b) which of them can be turned into measurable indicators and which cannot.

Drastic differences in both quality of life and quality of education in the regions of Kazakhstan call for a targeted, specific approach. If we want to provide equal educational opportunities to every child, producing isolated policies and initiatives solely in the education sphere and expecting them to work is not enough.

Yet before starting to work on

reducing such a knowledge gap, the Ministry of Education and other governmental bodies need to have substantial data, which can only be obtained through rigorous regional research. Moreover, a holistic understanding of the scope of the problem is needed. As secondary education clearly is and will always be primarily the prerogative of the Ministry of Education, it is important to identify exactly what it can change in the “school territory” in a particular region, but only as part of a vision, strategy, and action plan for the whole region.

Thus, a two-step policy initiative is proposed—a nationwide study of the reasons for regional inequality in education, followed by human capital development programs for all regions. The “human capital” idea rests on the assumption that changing the quality of secondary education and improving access to it in any region should be a priority of not one but all stakeholder institutions and government bodies.

Convening a group of qualified specialists (researchers, data scientists, economists, sociologists) unaffiliated with any of the local offices is vital for the success of the research stage. Surely, international experience on turnover initiatives for poorly-performing regions should be analyzed closely.

The theoretical goal of this research would be to understand the impact of every possible variable (including SES, language and local values, and any other “invisible” factors) on academic achievement. In practice, the

data would make it possible to identify the needs of schools that are lagging behind—in terms of teacher training, school infrastructure, and student body—and target them specifically at both regional and national levels.

These two are the “larger picture” measures aimed at getting holistic data and applying it to developing specific programs in each region.

In the meantime, certain specific steps can already be taken:

- Raising standards for enrollment in teacher training programs. To provide a high quality of education at schools and to have teachers able to work within the renewed curriculum framework, standards for university admissions and employment need to be raised.
- Raising salaries for teachers and LEA workers. Besides the international evidence that teachers’ salaries correlate positively with teaching quality and academic achievement, this is also important to attract the best graduates to teaching. Implementing these two steps simultaneously is a precondition for the success of both.
- Applying positive discrimination in terms of financial support for schools in rural areas. While research will highlight the impact factors for academic achievement, the disadvantaged reality of rural schools is plain as day. Certain measures can already be taken, including increasing financing and developing school infrastructure.
- Opening public study facilities in disadvantaged neighborhoods to compensate

for families’ low socioeconomic status. Given that exposure to learning resources and gadgets at home has a strong connection to a child’s learning outcomes, providing children in remote rural areas with study rooms with free Internet, computers, and libraries could contribute to mitigating this effect. It is important to attract local entrepreneurs and bigger manufacturers as potential sponsors.

- Attracting Bolashak graduates to teaching and regional LEAs. Engaging more “Bolashakers” in civil service has long been discussed in policy and media circles, with the prime concern being that they would not be motivated to take low-paid jobs. To this end, creating a pool of Bolashak graduates for state service in the regions would be a good first step toward revitalizing local educational authorities. It is also important to create a pathway for graduates of non-pedagogical faculties to teach in schools, perhaps by introducing a PGCE-like program. Providing the best university graduates with competitive wages is a vital aspect of retaining them in a given profession. To do this, we could draw on the worldwide experience of Teach for All: its Russian analogue, for example, invited large companies to sponsor program graduates’ salaries.
- Inviting more private companies and sponsors to invest in/open private schools and sponsor public schools. Offering inducements like lighter regulations for private schools in South Kazakhstan region could boost entrepreneurial interest in such activities.

Appendix. LAYS calculation

Step 1—calculating LAYS on the assumption that learning starts at school

To calculate region-level learning adjusted years of schooling (LAYS), I follow Filmer et al.’s formula:

$$LAYS_c = S_c * R_{n/c}$$

S_c is “the average years of schooling acquired by relevant cohort of the population,” and $R_{n/c}$ represents “a measure of learning for a relevant cohort of students in country c , relative to numeraire (benchmarking country)” —in other words, learning productivity.⁷⁶ It is calculated as the ratio of average learning happening per year in respective countries: $R_{n/c} = L_c/n$.

I adjust this formula to calculate region-level LAYS for Kazakhstan. I use mean years of schooling for Kazakhstan as calculated by Barro and Lee (originally used for LAYS measure),⁷⁷ and I take Almaty city as a benchmarking region (Filmer et al. used Singapore’s scores for international-level analysis).

Thus, expected years of schooling for Kazakhstan (S_c) is set at 14 (11 years of school plus 3 years of preschool). However, I also performed calculations on the assumption that learning starts at school (grade 1),⁷⁸ thus getting the LAYS results for 11 years of schooling instead of 14.

TIMSS 2015 scores for eighth grade are used to calculate region’s learning per year (L_c). For example, if Almaty’s score in eighth-grade math is 575 and prior years of schooling equal 8, then its average learning per year is 71.2. To compare, Mangystau oblast’s score is 476, which gives us 59.5 as its average learning per year. Thus, $R_{n/c}$ for Mangystau oblast would be $59.5/71.2=0.83$, compared to 1 for Almaty city, which is the benchmarking region. This allows us to calculate LAYS for Mangystau oblast according to the formula above as equal to 9.1 years (see Table 7).

This means that by graduation, students in Mangystau oblast will have covered approximately 9.1 years of learning out of the expected 11.

These calculations are then modified to account for the years that take place prior to school.

Step 2—modifying LAYS on the assumption that learning starts 3 years prior to school

In their explanation of the LAYS measure, Filmer et al. pay attention to the question of when learning actually starts and how this might impact the LAYS calculation.⁷⁹ Table 5 shows the LAYS data I got on the assumption that learning starts at first grade (i.e., at school).

However, as the authors mention, “every child acquires some language, mathematical concepts, reasoning skills and socioemotional skills before arriving at school.”⁸⁰ To adjust the formula for the years of learning taking place prior to school, L_c is now calculated as the ration of test score (T) to the sum of years of schooling prior to assessment and years of learning prior to school (3+8).

To come back to the example of Mangystau oblast, its L_c will now be equal to 43.2 (score of 476 divided by sum of 3+8). Almaty city’s learning per year will be equal to 52.3. Thus, $R_{n/c}$ (learning productivity) for Mangystau oblast will now be 0.82.

Therefore, the modified formula, accounting for 3 years of learning prior to school, will be:⁸¹

$$LAYS_c = [S_c * R_{n/c}] - [Y^p * (1 - R_{n/c})]$$

It is clear that using this second assumption (as I did in my work) will result in lower LAYS scores. I think that this approach is truer to life than the first assumption that learning only starts at school.

Table 7. (LAYS) for regions of Kazakhstan (learning starts at school)

	TIMSS score 4 th grade, science	LAYS	TIMSS score 4 th grade, math	LAYS	TIMSS score 8 th grade, science	LAYS	TIMSS score 8 th grade, math	LAYS
Almaty city	623	11	608	11	591	11	575	11
East Kazakhstan oblast	588	10.4	582	10.5	574	10.7	560	10.7
Zhambyl oblast	581	10.3	582	10.5	580	10.8	573	11.0
Kyzylorda oblast	582	10.3	582	10.5	570	10.6	581	11.1
Pavlodar oblast	573	10.1	561	10.1	556	10.3	544	10.4
North Kazakhstan	554	9.8	549	9.9	554	10.3	523	10.0
Aktobe oblast	557	9.8	548	9.9	511	9.5	530	10.1
Karagandy oblast	547	9.7	540	9.8	529	9.8	522	10.0
Astana city	544	9.6	536	9.7	530	9.9	515	9.9
West Kazakhstan oblast	544	9.6	535	9.7	525	9.8	519	9.9
Atyrau oblast	536	9.5	533	9.6	471	8.8	478	9.1
South Kazakhstan oblast	530	9.4	533	9.6	522	9.7	522	10.0
Akmola oblast	538	9.5	529	9.6	528	9.8	511	9.8
Kostanay oblast	549	9.7	523	9.5	516	9.6	494	9.5
Almaty oblast	519	9.2	511	9.2	507	9.4	504	9.6
Mangystau oblast	504	8.9	508	9.2	473	8.8	476	9.1

Source: Author's calculation on the basis of TIMSS-2015 data for Kazakhstan

Correlation between different LAYS calculations

Correlation between two LAYS measures for eighth-grade math (learning starts 3 years prior to school and learning starts at school, in first grade) is **1**.

Correlation between two LAYS measures for TIMSS 2015 *eighth-grade science and math scores* is **0.93**.

Notes

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¹² Ibid., 17.

¹³ Eric Hanushek and Ludger Woessmann, "The High Cost of Low Educational Performance: The Long-Run Economic Impact of Improving PISA Outcomes," OECD, Paris, 2010, <https://www.oecd.org/pisa/44417824.pdf>.

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¹⁵ Aart C. Kraay, "Methodology for World Bank Human Capital Index (English)," World Bank Group, Washington, D.C., 2018, <http://documents.worldbank.org/curated/en/300071537907028892/Methodology-for-a-World-Bank-Human-Capital-Index>.

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¹⁷ World Economic Forum, "The Global Human Capital Report 2017."

¹⁸ Klaus Schwab, "The Global

Competitiveness Report 2018," World Economic Forum, Geneva, <http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf>.

¹⁹ Hanushek and Woessmann, "The High Cost of Low Educational Performance," 12.

²⁰ Robert J. Barro and Jong-Wha Lee, "A New Data Set of Educational Attainment in the World, 1950-2010," *Journal of Development Economics* 104 (2013): 184-198. doi: 10.1016/j.jdeveco.2012.10.001; Deon P. Filmer, F. Halsey Rogers, Noam Angrist, and Shwetlana Sabarwal, "Learning-Adjusted Years of Schooling (LAYS): Defining A New Macro Measure of Education (English)," World Bank Group, Washington, D.C., 2018, <http://documents.worldbank.org/curated/en/243261538075151093/Learning-Adjusted-Years-of-Schooling-LAYS-Defining-A-New-Macro-Measure-of-Education>.

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³⁸ Chandra Muller and David Kerbow, “Parent Involvement in the Home, School, and Community,” in *Parents, Their Children, and Schools, 1st ed.*, ed. J. Coleman (New York: Routledge, 2018), 192.

³⁹ Wilson, “The Determinants of Educational Attainment,” 545.

⁴⁰ Edgerton et al., “Back to the Basics,” 877.

⁴¹ *Ibid.*, 880.

⁴² Melaku Tesfa Tesema and Johan Braeken, “Regional Inequalities and Gender Differences in Academic Achievement as a Function of Educational Opportunities: Evidence from Ethiopia,” *International Journal of Educational Development* (2018): 51-59, 52.

⁴³ Gennanioli et al., “Human Capital and Regional Development.”

⁴⁴ *Ibid.*, 129.

⁴⁵ *Ibid.*, 152.

⁴⁶ *Oblast* – administrative and territorial division of Kazakhstan.

⁴⁷ PISA assesses the functional literacy of 15-year-olds.

⁴⁸ Angrist et al., “Measuring Human Capital (English).”

⁴⁹ The international report on PISA 2015 results only includes Kazakhstan’s results for closed-ended questions.

⁵⁰ I am analyzing data for 16 regions instead of 17 because TIMSS 2015 was administered *before* the division of South Kazakhstan. Thus, separate data for academic achievement of Shymkent city and Turkestan oblast, as well as data on their economic performance in 2015, are not available at present.

⁵¹ Filmer et al., “Learning-Adjusted Years of Schooling (LAYS).”

⁵² *Ibid.*, p. 3.

⁵³ For a detailed explanation, see

Filmer et al., “Learning-Adjusted Years of Schooling (LAYS).”

⁵⁴ Information-Analytic Centre, “Natsional’nyi doklad o sostoianii i razvitiu sistemy obrazovaniia Respubliki Kazakhstan (za gody Nezavistimosti Kazakhstana).”

⁵⁵ World Bank Group, “Kazakhstan” country brief, 2018, accessed July 22, 2019, https://databank.worldbank.org/data/download/hci/HCI_2pager_KAZ.pdf.

⁵⁶ Dinara Alimkhanova, “Understanding the Rising NEET Phenomenon in Southern Kazakhstan,” *CAP Paper* 206, George Washington University, Washington, DC, June 2018, <https://centralasiaprogram.org/archives/12460>.

⁵⁷ Filmer et al., “Learning-Adjusted Years of Schooling (LAYS).”

⁵⁸ The Nazarbayev Intellectual schools (NIS) are a network of 20 schools for gifted students established in 2008. They were also a main developer of the renewed national curriculum.

⁵⁹ Unified National Testing, a standardized test that school graduates must pass as a final examination.

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