Kazakhstan had participated in the Programme for International Student Assessment (PISA) for the fourth time. The test results fell below the performance of previous years. Research suggests the relationship between funding and quality of education.

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Kazakhstan's PISA performance

At the end of 2019, the Organization for Economic Cooperation and Development (**OECD**) published the initial results of the PISA-2018 worldwide study. Kazakhstan had its **worst performance** in the history of the country's participation. Students from 79 countries and economies have participated in the study. 15-year-olds from Kazakhstan placed 69th.

PISA (Program for International Student Assessment) is a study intended to measure school pupils' scholastic performance. The program was launched in 2000. The research cycle takes place every three years; the assessment focuses on one of the subjects – reading (2000, 2009, 2018), mathematics (2003, 2012), and science (2006, 2015).

It is Kazakhstan's fourth time participating in the assessment. The country's performance has been improving since 2009 but showed a decline in 2018.

Kazakhstan's first participation in 2009 was a big test for the country. Kazakhstan ranked 59th among 69 participating countries back then. 5590 students from 200 educational institutions participated in the test.

The results were slightly better in 2012. 5808 students from 200 schools and 18 colleges, 3522 students with the Kazakh language of instruction, and 2286 students from Russian language schools. The overall result is 45th place out of 65 participating countries.

Kazakhstan's performance in 2015 was surprisingly high (average score of 460). But as it turned out, the country's results were excluded from international data due to the potential of bias in marking and a proportional sampling. Of the 5780 school and college students, 2061 were students of the Nazarbayev Intellectual School[1].

A recent study suggests the country **needs to catch up with** its own results of the past

years – all lower than the first-year performance. The difference between **PISA 2015 and PISA 2018** is 37 score points in mathematics, 59 – in science, and 40 – in reading literacy[2]. This is reviewed further in the table below:

The diagram demonstrates a decline in indicators for all three subjects in 2018. For example, the 2018 results for mathematics are higher than only the 2009 indicators. Unlike mathematics, it has been the worst performance in science and reading literacy over the years of the country's participation.

2018 PISA Results

Kazakhstan's participation in **PISA** during the entire time had demonstrated a 1.5-2-year gap between 15-year-olds from Kazakhstan and their peers from other OECD countries. This is evidenced by the 2018 average score across OECD. For instance, the performance difference between Kazakh students and the OECD average was 66 points in mathematics (the average across the OECD is 489 points, whereas Kazakhstan scored 423 points), 92 points in science (489 against 397) and 100 points in reading literacy (487 against 387).

According to the **PISA 2018** results **for** Kazakhstan, 36% of students attained a level 2 proficiency in reading, compared to the OECD average of 77%. At this level, students can identify the main idea in a text of moderate length, find information based on explicit, sometimes complex criteria, and reflect on the purpose and form of texts when explicitly directed to do so. Girls showed better results than boys, with a difference of 27 points. This indicator is similar to the OECD average, where girls score 30 points higher than boys.

About 51% of students in Kazakhstan attained a level 2 proficiency in mathematics. Some 76% of students across OECD countries attained level 2 in mathematics. These students can interpret and recognize, without direct instructions, how a situation can be represented mathematically (e.g. comparing the total distance between two alternative routes or translating the price into another currency).

Only 2% of pupils in Kazakhstan attained a level 5 or higher in mathematics, whereas the OECD average is 11%. Chinese, Singaporean and Korean students outperformed their peers in attaining this level of math proficiency. These students can mathematically model complex situations, as well as select, compare, and evaluate appropriate problem-solving strategies for dealing with complex problems related to these models. Boys showed better results than girls, with a difference of 1 point. For the OECD, this difference is 5 points.

40% of Kazakh students attained level 2 or higher in scientific literacy. The OECD average is 78%. Students at this level can select the correct explanation of familiar scientific phenomena and can use such knowledge to identify, in simple cases, whether a conclusion is valid based on the data provided. Girls showed better results than boys, with a difference of 7 points (OECD average: girls score 2 points higher)[3].

So, most of the Kazakh pupils have attained level 2 and below. This suggests that 15-year-olds are not able to analyze and comprehend the text they have read. Per the OECD gradation, these students are classified as "functionally illiterate". The majority of students that set for PISA assessment did not apply the minimum of their mathematical and scientific knowledge. Of even greater concern is the fact that only very few students from Kazakhstan attained the highest levels (levels 5 and 6) in three literacy areas; the largest number being in mathematics (2%). Such a result could harm the quality of teaching, scientific advances and breakthroughs, and consequently on the country's economy and innovations.

What causes Kazakh students to lag behind?

Kazakhstan's Education and Science Minister Askhat Aymagamabetov, on his Facebook page, commented on the country's poor performance in the international assessment.

First, he asserts, the computer delivery turned out to be new for Kazakh pupil who went through computer-based assessment for the first time. The Minister referenced South Korea when the Korean 15-year-olds showed lower results in all three subjects.

The ICILS 2018 study (International Computer and Information Literacy Study for Grade 8 Students) with 14 participating education systems also attests to the gap in IT literacy. Kazakh pupils had the lowest results[4]. Now of course, such information technology literacy will affect the results of other computer-based assessments, like the **PISA 2018**.

The Minister further claims that while the assessed students from top-performing countries like Japan or Singapore were in grade 10, half of the students sampled for the assessment in Kazakhstan (44%) were in grade 9. This is because parents in Kazakhstan enroll their children in schools when they are 6 and even 7 years old. PISA requires students for the assessment to be between the ages of 15 years 3 months to 16 years 2 months.

Minister Aymagambetov believes that the efforts of updating the curriculum will pay off in PISA 2021 and PISA 2024. He concluded that the new curricula results can be observed only after 7-8 years[5].

Economic forces

PISA studies indicate the relationship between funding and quality of education. Over the past 10 years, the funding of education in Kazakhstan has not dropped below 3% of GDP. The total spending on education in 2018 amounted to 3.52% of GDP. Ukraine, for example, spends about 7% of its GDP on education. By the way, Ukraine participated in PISA 2018 assessment for the first time and placed 39th. Kazakhstan is nearly 40 scoring points, i.e. corresponding to 1.5 years of schooling gap, behind countries with equal GDP.[6]

Given the cost per student, the difference is enormous. Singapore, Japan, and Finland allocate 10-14 thousand dollars per student from the country's budget. Hence, they outperform other participating countries in the PISA assessment[7]. It is difficult, however, to determine the per-student cost for Kazakhstan due to recent frequent fluctuations in the tenges exchange rate. Taking 2019, when the per capita funding was introduced in schools of the country's large cities, an average of 224 thousand tenges was allocated for each child. At the exchange rate for September 2019, the amount was equal to 577 dollars.

Socio-economic status as a factor

Socio-economic status encompasses several characteristics for both students and the education system. PISA examines the index of economic, social, and cultural status, which is derived from several variables: parents' level of education and their highest occupational status, certain property or home possession, as well as the number of books and other educational resources available at home.

The latest PISA 2018 study found that socio-economically advantaged students in Kazakhstan outperformed their disadvantaged counterparts in reading by 40 score points. This is less than the average difference between the two groups across OECD countries (89 points). Although 9 years ago, the PISA 2009 results pointed the performance difference related to the socio-economic status amounted to 83 score points in Kazakhstan and 87 on average in OECD countries.

16% of disadvantaged students in Kazakhstan and 11% on average in OECD countries were able to score in the top quarter of reading performance, which indicates that socioeconomic status is an important factor but not a destiny. Much depends on the desires and aspirations of children themselves[8].

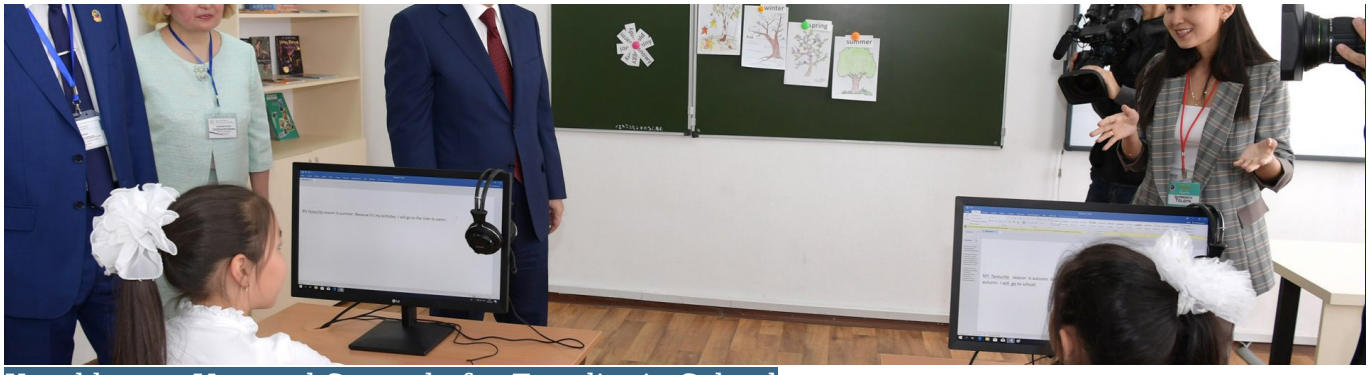
Parents' level of education also impacts the success of education. According to the PISA 2015 results, 67% of socially-advantaged students have parents with a degree, while only

11% of disadvantaged students have parents with higher education. The difference between children with parents who have a degree and who don't is 34 points, an equivalent to one academic year.

Access to books, a desktop or a place, and a computer with Internet access have a substantial impact on the student's learning outcomes. Children who have more than 200 books in their home library show results in scientific literacy 56 points higher than those of their peers who have less than ten books at their homes. A similar 2-year gap can be observed among students who do not have a desktop for homework. The performance difference for students lacking computers with Internet access at homes is 44 points in scientific proficiency or 1,5 years of schooling[9].

Weak digital education infrastructure

As the pandemic spreads rapidly and the whole country shifts to a strict quarantine rule, the Education Ministry has decided to complete the rest of the semester 2 in Kazakhstan's schools via distance-learning. It was clear, already at trials and demo-lessons, that neither the Internet nor ICT technologies were prepared for it. Kazakhstan's President Kassym-Zhomart Tokayev on April 10, 2020 at a meeting of the Emergency Rule State Commission criticized the ongoing digitalization in Kazakhstan: "… a well-publicized E-Learning system, as entertainers would say 'went kaput'"[10].


Kazakhstan: Unequal Struggle for Equality in School

Interestingly, for many years official reports and presentations talked about the "good" Internet in all schools across Kazakhstan. For instance, the latest education system statistics for 2019 claim that 98.3% of schools in Kazakhstan have access to the Internet, 90.3% of schools are connected to the Internet at a speed above 4 Mb / s[11]. However, both the 2018 PISA & ICILS studies and the current crisis had revealed the real potential of telecommunication technologies in Kazakhstan. In this connection, the Education Ministry

was forced to abandon online education[12].

Thus, we may establish that the "Digital Kazakhstan" state program and the "Modernization of Secondary Education" project, both under implementation since 2018, fell short of stated objectives. The quarantine not only reinforced the Internet issue in Kazakhstan but also exposed the lack of computers in schools and among teachers. Although based on the education system informatization strategy, teachers should have been equipped with personal computers in 2018. Therefore, the "new" computer testing delivery, unfortunately, might have been a reason for the poor assessment results.

Based on the discussed above, the following **brief recommendations** are offered:

- Embed all the PISA assessment tasks into school curricula; develop similar tasks and materials for updating the curriculum program;
- increase funding per student in Kazakhstan and bring to the OECD countries average;
- for policymakers – elevate the reading and increase of reading literacy to rank it a State ideology, support citizens' initiatives, volunteer movements to distribute books for rural schools and children, open libraries and bookhouses in rural areas;
- while updating the computer park in schools, grant old computers to needy children;
- total connectedness and digitalization of education. One way is to ensure that all schools have Internet access for basic and supplementary education.

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