



IRSTI 14.91
Scientific article

<https://doi.org/10.32523/3080-1710-2025-151-2-195-211>

The analysis of the participation of Uzbekistan and Kazakhstan in the PISA international assessment study

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Abstract. This article is devoted to investigating the participation of two Central Asian countries in the PISA international assessment study. It is important to consider that Kazakhstan and Uzbekistan started modernizing and implementing foreign experience in their education system after gaining their independence. Both countries should have assessed their general secondary education system to evaluate the results of their reforms. Kazakhstan made its first step by participating in PISA in 2009. Uzbekistan only started this participation in the PISA-2022 assessment study. The systematic analysis of the documents of both countries reveals that they aim to achieve higher results in this research in a short time. The comparative analysis of the PISA-2022 results of both countries and their preparation for this international study helped to discover the problems related to their education system. This article also studied the factors that have made a contribution to the results of both countries. Analysing the reports made by the OECD about the PISA-2022 study helped to come to some conclusions. Finding solutions for the problems in general secondary education in post-soviet countries by comparative analysis is one of the main purposes of this article.

Key words: PISA, OECD, Kazakhstan, Uzbekistan, reading, mathematics, science, creativity, educational reforms, general secondary education, international assessment

Introduction

The development of any country depends on the quality of its education system. This is because the education system produces specialist personnel who run the economy of the country. Therefore, like many other countries, Central Asian countries, including Kazakhstan and Uzbekistan, are paying great attention to developing their continuous education system. Evaluating the quality of the education system plays a great role in creating a quality education system. Nowadays, the government of Uzbekistan is focusing on participation in various international assessment studies, such as PISA, PIRLS, and TIMSS, and using their results to determine and solve the problems in the education system. Kazakhstan started to focus on this issue earlier than Uzbekistan. Kazakhstan's first participation in the PISA study was in 2009.

Received: 25.04.2025; Revised: 19.06.2025; Accepted: 29.06.2025; Available online: 30.06.2025

Then Kazakhstan participated in the PISA international assessment studies in 2012, 2015, and 2018.

This article investigates and analyzes comprehensively Uzbekistan's first participation in the PISA international assessment study and Kazakh 15-year-old students' performance in several PISA studies. The conclusions were made after analyzing the results of the PISA-2022 and the research articles of various specialists in this area.

Uzbekistan planned to enter the top 30 countries in the PISA study by 2030. Therefore, the conclusions made by historical review and learning other countries' experiences are relevant to the purposes of the education system. In this case, Kazakhstan's participation experience and the results performed by Kazakh students might help make the purposes of Uzbekistan possible and find solutions to the problems that Uzbekistan might face in reaching its goals.

This article analyzes the participation of Uzbekistan and Kazakhstan in the PISA-2022 study based on the results of this cycle in the PISA study. This comparative analysis examines the key PISA indicators of the two countries based on the results published by the OECD. It also analyzes the status of creative thinking and learning strategies, with numerical data compared through tables. One of the main novelties of the article is that it discusses the recent results announced by the OECD in 2024. Moreover, Kazakhstan's experience in this area has not been studied in Uzbekistan. The main purpose of this research is to draw some conclusions for improving Uzbekistan's performance and results in the next studies by analyzing Kazakhstan's experience and results. Furthermore, this research aims to conclude the current problems in the education systems of Uzbekistan and Kazakhstan. The conclusions drawn from this comparative analysis may contribute to the development of the education systems of both countries.

Literature review

In the modern scientific world, many scientific articles can be found on the results of international assessment studies of education, and they are sure to be of great importance in investigating the current problems in the education systems and tackling those issues. A large group of researchers worldwide studied the efficiency of the reforms in the education system and their reflections on the PISA results in Kazakhstan. The researchers led by Yerbol Sarmurzin analyzed the impact of the international study made by the OECD on the education system of Kazakhstan (Sarmurzin et al, 2021, pp. 757-766). Another group of researchers studied the perceptions of some Kazakh teachers about the PISA study and its impact on the education system (Aldabayeva et al, 2023). Abulqosimova (2020) studied the issues of modernization in the general secondary education system of the Republic of Kazakhstan. Toybazarova & Nazarova (2017) addressed the modernization problems of Kazakhstan's education system, including the participation of this country in the previous cycles of the PISA study. Another group of researchers tried to broadcast different types of factors influencing the results of schoolchildren in the PISA-2018 international study (Ospanova et al, 2023). Smanova (2021) found the association between school location and reading performance by analyzing the results of urban and rural Kazakhstani students in PISA-2018 study cycle.

Although Uzbekistan participated in the PISA study for the first time in 2022, several scientific articles have been published about the results of this international assessment study. Kurbaniyazov & Allayorova (2024) analyzed the PISA-2022 results of Uzbekistan in their

research, named “The ways for organizing the process of evaluating the quality of education based on the requirements of the PISA international program”. In the PhD dissertation called “The methodology of using the STEAM – educational technology in primary schools (as an example of science)” in pedagogical sciences written by Tashibekova (2022), the importance of using the STEAM technology for achieving higher results in science assessment of the PISA study. Djalilov (2024) tried to reveal the situation in language and literature education by reviewing the reading results of Uzbek 15-year-old students in the PISA-2022 study. However, there are no comparative studies conducted to evaluate the results of two Central Asian countries and their prospects in this international assessment.

Methods

The decrees of the President of the Republic of Uzbekistan, the decrees of the Cabinet of Ministers, and some reports of the Department of Public Education of Namangan Region were studied for collecting information about the preparation of Uzbekistan for the PISA study, and the first performance of Uzbek students. While official documents give information about the assignments of the government of Uzbekistan for developing the education system, the articles of journals and newspapers helped to analyze the results of the PISA study and to learn the attitudes toward these results. The online availability of official documents created a convenient opportunity to use them. The scientific journal articles played an important part in approaching different perspectives on the PISA results.

During the information collection for the research the archive documents of the Ministry of Higher Education, Science and Innovations of the Republic of Uzbekistan and the Ministry of Preschool and School Education of the Republic of Uzbekistan were used. Archive documents include official data, because they are important to study the process related to the preparation for the PISA in Uzbekistan.

The official reports of the OECD and the articles published in scientific journals were studied to analyse the results of the performance of Uzbek and Kazakh students in the PISA. The comparative analysis of the results of the two countries became important to achieve the intended purpose of the research. This is because Kazakhstan’s experience in participating in the PISA study might help to draw some conclusions for Uzbekistan. The tables and figures were significant for generalizing the results of the research. The tables consist of the results of both countries and they have been a great part of this research.

Results and discussion

The participation history of Kazakhstan and Uzbekistan in the PISA study

The Organisation for Economic Cooperation and Development (OECD) has been assessing the knowledge and skills of 15-year-old students of many countries through its international assessment program called PISA (The Programme for International Student Assessment) since 2000 (Kenjayeva, 2024, p. 3). This program stands out by drawing a conclusion about the state of the education system and its problems by comparing the results of participating countries. The OECD is organizing the PISA international assessment system which studies students’ knowledge and how they can use their expertise in real-life situations, compares the quality and

equity in education, gives opportunity to make efficient administrative decisions in education by learning the policy and practice created by other countries (Kurbaniyazov & Allayorova, 2024, p. 59). According to the OECD, the PISA assesses students' knowledge and skills essential for full participation in economic and social life. Moreover, it evaluates students' ability to apply their knowledge in unfamiliar settings, both in and outside their school (OECD, 2023, p. 38). The PISA assessment study has become one of the most popular international assessment studies in evaluating education systems and students' knowledge and abilities.

PISA surveys are conducted every three years. The cyclical nature of the study enables participating nations to track students' educational achievements and the impact of their educational systems, and develop policy directions in general secondary education. The seventh cycle of the PISA was conducted in 2018 (Sarmurzin et al., 2021, p. 758).

Kazakhstan participated in the PISA survey for the first time in 2009. The government of the country set its strategic purposes for achieving higher results at that time. For example, it is aimed that the rankings of the students of Kazakhstan for the PISA study should be 50-55th in 2015 and 40-45th in 2020, according to the state program of education development in the Republic of Kazakhstan for 2011–2020 (the President of the Republic of Kazakhstan, 2010). Setting such kind of goals shows that Kazakhstan aimed to modernize its education system and integrate international standards into general secondary education..

The government of Uzbekistan decided to participate in international assessment studies, such as the PISA, to implement foreign experience in its education system, among essential reforms in education. In the decree of the Cabinet of Ministers of Uzbekistan named 'On measures for organizing international studies in the field of education quality assessment in the public education system' issued on December 8, 2018, the tasks for managing the studies of some international assessment programs, such as PISA, PIRLS, TIMSS, and TALIS were set (The Cabinet of Ministers of the Republic of Uzbekistan, 2018). There were also tasks for the preparation period in this decree. As an example, the task involved exploring the participation and organizational practices of Russia and Kazakhstan in international assessments.

All regions of Uzbekistan started to prepare for these international studies. There were other documents related to the preparation period for these international studies. For example, on April 29, 2019, the decree of the President of the Republic of Uzbekistan 'On approval of the concept for the development of the public education system of the Republic of Uzbekistan until 2030' was issued. According to this concept, Uzbekistan should enter the top 30 countries in the PISA rankings by 2030 (The President of the Republic of Uzbekistan, 2019). It was a great responsibility for the Ministry of Public Education and all schools in Uzbekistan.

The preparation process for the PISA in Uzbekistan

During the preparation process, Uzbekistan worked with the representatives of the OECD. The delegates of the OECD supported the idea that Uzbekistan should learn from the experience of the countries performing well in the PISA study (such as Finland, Singapore, Estonia, and South Korea). They claimed that the OECD is ready to help find partners and send experts. Michael Word, the PISA Project Officer, was appointed as a permanent representative who works with Uzbekistan (Nosirov, 2019, p. 7). Partnership relations were important in preparing for the studies on PISA. Therefore, the issue of learning the experience of the countries achieving higher results in the PISA study.

To prepare for international assessment programs, Abdulla Avloni Scientific Research Institute for Studying the Problems of Public Education and Defining its Prospects created the platform named 'STesting' (Archive of the Ministry of Preschool and School Education of the Republic of Uzbekistan. Orders of the Ministry of Public Education of the Republic of Uzbekistan on the main activities. 2021 December. Order № 404). It is the platform that includes tests and videos intended for building skills for working with the tasks in the studies of PISA, TIMSS, and PISA. Exceeding 100 videos and 1500 tests were created and uploaded on this platform within this project. The platform was tested in basic during September and October 2021. The most important thing is that it was a free platform to use. More than 2,6 million students had been registered until 2022 (Shukurova, 2022, p. 2). This project was continued with the name of 'STesting-2' (A MPSE RU. Orders of the Ministry of Public Education of the Republic of Uzbekistan on the main activities. 2022, June. Order № 206). The creation of this platform made facilities for students to prepare for the PISA study.

The scientific and scientific-practical conferences organized by the researchers and scientists of pedagogical sciences of the republic were significant for the preparation procedure for international assessment studies. For example, the international conference on the topic of "Prospects of introducing international assessment programs to primary education" at Tashkent State Pedagogical University on April 15, 2021, and the republican conference on the theme of "The role and importance of international assessment programs (PIRLS, PISA, TIMSS, TALIS) at the current stage of educational system reform" at Regional center for retraining and improving the qualifications of public education staff of Namangan region on May 12, 2021, were organized (Archive of the Ministry of Higher Education, Science, and Innovations of the Republic of Uzbekistan. Orders of the Ministry of Higher and Secondary Specialized Education of the Republic of Uzbekistan on the main activities. March 2021. Order №108-159. Sheet №261-263). The discussions at these conferences were valuable for determining their practical tasks in implementing international assessment programs in education.

It was planned that Uzbekistan would participate in the PISA study in 2021. However, the study was moved to April and May 2022 because of the pandemic situation in the world (Tashibekova, 2022, p. 27). The reason for delaying the study was noted in the report of the OECD. According to this report, while the eighth cycle of the assessment study had been planned for 2021, the PISA Governing Board postponed the assessment to 2022 because of the many difficulties education systems faced due to the COVID-19 pandemic (OECD, 2023, p. 38). The questions about the closure of the schools were also input in the PISA-2022 study.

In the plan of measures for 2022 of the Ministry of Public Education of the Republic of Uzbekistan to improve the position of the Republic of Uzbekistan in priority international ratings and indexes, it was noted that 15-16-year-old students would participate in the PISA study in May 2022, the activities for increasing the awareness of pedagogs about international assessment programs (PISA, PIRLS, TIMSS, and TALIS) would have been held in October 2022. Furthermore, the plans related to incorporating questions and tasks of the international PISA approach into the educational content were also input (A MPSE RU. The Measures (roadmap) signed by the leadership of the Ministry of Public Education of the Republic of Uzbekistan, 2022). There were no expectations for higher results in the first participation of Uzbekistan. This is because it was not right to expect big changes in the education system in a short period from a country participating in international research for the first time. Therefore, according to

the concept of the development of the Public Education system of Uzbekistan until 2030, there was no purpose in the rating of the PISA for 2022; however, for 2023, Uzbekistan should have entered the top 70 countries in 2023 (The President of the Republic of Uzbekistan, 2019).

The initial participation of Kazakhstan in the PISA study and the attitudes toward this involvement

Kazakhstan had participated in the PISA study four times before the PISA-2022 in 2009, 2012, 2015, and 2018. There are some studies related to the analysis of the performance of Kazakh students in this study, and they might help to express the situation related to the development in the general secondary education of Kazakhstan. In one of these studies, the questionnaire was taken from the teachers who were working in the schools of Astana, Kokshetau, and Pavlodar. The attitudes of the teachers were defined in this survey. According to the outcomes of the survey, most of these teachers considered that they were satisfied with their students' results in the PISA. Nevertheless, many teachers were neutral (33%) about if the PISA study is reliable or not (Figure 1). 44% of these teachers felt that they were responsible for the results of their students (Aldabayeva et al., 2023, p. 8).

The questionnaire results of the teachers to the question "Do you find PISA a reliable system of assessment?"

■ strongly agree ■ agree ■ neutral ■ disagree ■ strongly disagree

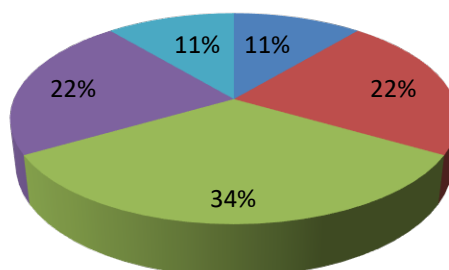


Figure 1. The questionnaire results of the Kazakhstani teachers to the question "Do you find PISA a reliable system of assessment?"

Source: Aldabayeva, K., Mazhenova, K., Turdiyeva, Z., Turgynbay, N., & Zhumagaliyeva, M. (2023, January 3). KAZAKHSTANI TEACHERS' PERCEPTIONS OF PISA RESULTS. <https://doi.org/10.35542/osf.io/s6c9j>

In the research that analyzes the performance of Kazakh students in previous cycles of the PISA study in 2009, 2012, and 2015, Kazakhstan improved its results like some countries (Figure 2). Nevertheless, it was emphasized that these results were much lower than the average among the OECD countries. Moreover, the problems related to reading, mainly with understanding

texts, were mentioned. According to this study, the teachers in general secondary schools provide high-level knowledge from their subjects; however, they do not instruct how to apply their knowledge in real-life situations (Mailybaeva et al., 2019, p. 622). The first participation of Kazakh students in the PISA-2009 showed that it was necessary to reform the education system of Kazakhstan. Then, the government of Kazakhstan started to make some reforms in its education system. As a consequence, the achievements of Kazakh students increased in following PISA studies. Kazakhstan made a leap from 59th to 49th among OECD countries. However, the decrease in 2018 revealed that the current education system was not as successful as intended (Sarmurzin et al., 2021, pp. 760-761).

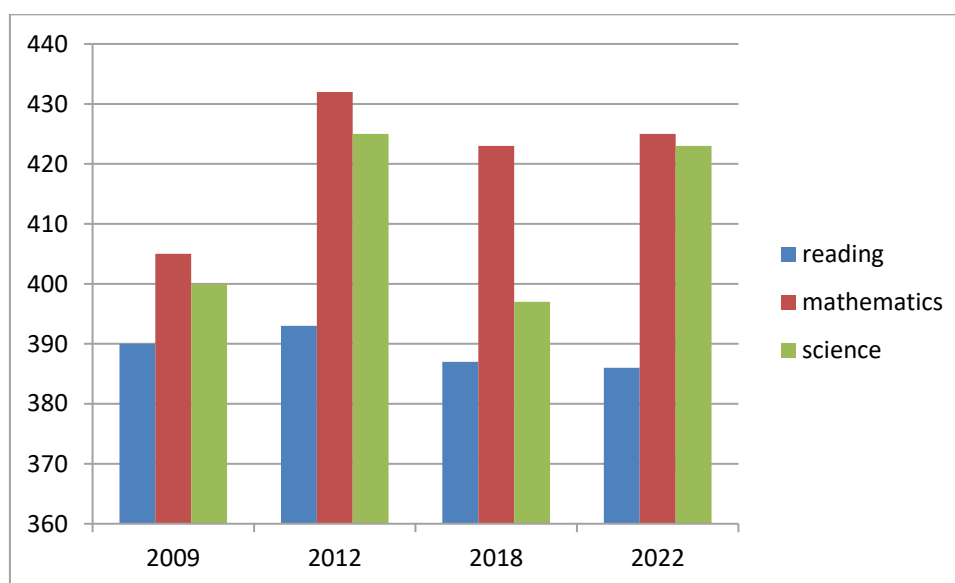


Figure 2. Mean scores of Kazakh students in the PISA study for the years 2009, 2012, 2018 and 2022

Source: Sarmurzin, Y., Amanzhol, N., Toleubayeva, K., Zhunusova, M., & Amanova, A. (2021). The impact of OECD research on the education system of Kazakhstan. *Asia Pacific Education Review*, 22(4), 757–766. <https://doi.org/10.1007/s12564-021-09715-8> and OECD (2023), PISA 2022 RESULTS: FACTSHEETS – KAZAKHSTAN. OECD publishing, Paris, <http://bit.ly/3W9b2Gb>

It can be seen that Kazakhstan faced the problems that Central Asian countries had in their education systems. According to another research that studied the modernization issues of the education system of Kazakhstan, there are some problems related to the traditions that have been left since the Soviet era. For instance, the Kazakh education system is based on limitless authority and leadership of teachers, and students learn to achieve ‘grades’ rather than acquiring knowledge. Another problem is a lack of attention to applying students’ knowledge in practice (Abylkassymova, 2020, p. 2).

The analysis of the main results of Uzbekistan and Kazakhstan in the PISA-2022 study

In the PISA-2022 study, the results of 15-year-old students from Uzbekistan became memorable for their low results. Uzbek students took 72nd with a 364-mean score in mathematics, 80th with a 336-mean score in reading, and 80th with a 355-mean score in science among the countries

that participated in the PISA-2022 study. Only Cambodia had lower results than Uzbek students performed (Ganiyev, 2024, p. 2). Some people consider that it is not a tragedy for the first time, while others are worried about such low results. Their concern may be justified because of higher results made by the students of the countries that are economically backward compared to Uzbekistan (Dusmatova, 2024, p. 3).

Although Kazakhstan showed lower results than the OECD average, Kazakh students achieved much higher results in three subjects compared to Uzbek students. 15-year-old Kazakh students had 425 score points in mathematics, 386 score points in reading, and 423 score points in science (OECD, 2023, p. 2). There was not a big difference in mathematics and reading from the 2018 results; however, they made a slight rise in science. It can be considered a success for Kazakhstan in that it recorded a higher result than countries like Brazil and Mexico. Despite the relatively low results in reading, the results in mathematics and science show the effectiveness of reforms in Kazakhstan's education system.

A separate analysis by subjects shows that there are serious problems in the education system in Uzbekistan. Uzbek students performed lower results than the OECD average in all three subjects. 19% of Uzbek students attained at least Level 2 in mathematics; this result was 69% for the OECD average. None of the students from Uzbekistan was able to attain Level 5 or Level 6 questions. 41% of the students from Singapore, the top ranked country in mathematics among high performers, were able to attain Level 5 or above. In reading, while 74% of all students were able to attain at least Level 2 on the OECD average, only 14 % of students achieved this level. No Uzbek 15-year-old students scored Level 5 or Level 6 questions, which demand comprehending lengthy texts, dealing with concepts that are abstract or counterintuitive, and establishing distinctions between fact and opinion. Like mathematics, 19% of Uzbek students attained at least Level 2 in science. The average result was 76% among the OECD countries. They were not able to attain Level 5 or above in this subject (OECD, 2023, pp. 2-3). These low results show the outcomes of its memorization-oriented approach in education. The students have not sufficiently formed the skills of thinking and applying the acquired knowledge in real-life situations.

Kazakhstan's performance analysis reveals that its results were much higher than those achieved by Uzbekistan. Nevertheless, these results are lower than the OECD average. In Kazakhstan, 50% of students attained at least Level 2 proficiency in mathematics. 2% of students were able to achieve Level 5 or above. In this case, the average among the OECD was 9%. Kazakhstan performed better also in reading than Uzbekistan, with 36 % of its students reaching a minimum of Level 2. 1% of students scored at Level 5 or higher in reading. In science Kazakh students performed their best because 55% of the students attained at least Level 2. 1% of students were top performers in science, meaning that they were proficient at Level 5 or 6 (OECD average: 7%). These students can creatively and autonomously apply their knowledge of and about science to a wide variety of situations, including unfamiliar ones (OECD, 2023, pp. 2-3). Although the results were lower than the OECD average, there was a slight rise from previous studies. The results of the two countries can be compared in Table 1.

Table 1. The percentage of top performers and low performers of Kazakhstan and Uzbekistan in mathematics, reading, and science.

Countries	Mathematics			Reading			Science		
	Score points	Students who attained at least Level 2	Students who attained Level 5 or above	Score points	Students who attained at least Level 2	Students who attained Level 5 or above	Score points	Students who attained at least Level 2	Students who attained Level 5 or above
Kazakhstan	425	50%	2%	386	36%	1%	423	55%	1%
Uzbekistan	364	19%	0%	336	14%	0%	355	19%	0%

Source: OECD (2023), PISA 2022 Results (Volume I): The State of Learning and Equity in Education, PISA, OECD Publishing, Paris,
<https://doi.org/10.1787/53f23881-en>.

According to Table 1, both countries achieved their highest results in mathematics, while the lowest results were in reading. There were not any top performers (the students who attained level 5 or above). However, at least 1% of students in Kazakhstan achieved this level. The highest number of students who attained Level 2 was in science. The comparison of the results with previous ones shows that Kazakhstan had a slight rise in the results of mathematics and science. However there was a mild decrease in reading. Even if the first participation of Uzbekistan might have been the reason for the low results, we should also pay attention to the results of Kazakhstan's first performance in the PISA-2009 study. It was much better than the results of Uzbek students in the PISA-2022 study.

Academic resilience

Socio-economic status was a predictor of performance in mathematics in all PISA-participating countries and economies. But this factor has not had much impact on the results of Uzbek students. In Uzbekistan, socio-economically advantaged students (the top 25% in terms of socio-economic status) outperformed disadvantaged students (the bottom 25%) by 22 score points in mathematics. This is smaller than the average difference between the two groups (93 score points) across OECD countries. Some 20% of disadvantaged students in Uzbekistan were able to score in the top quarter of mathematics performance (Figure 3) (OECD, 2023:4). Uzbekistan, Cambodia, and Kosovo are the countries that have the most students who achieved high results in mathematics, even their disadvantaged socio-economic status. The following figure in the report published for Uzbekistan's performance in the PISA-2022 study proves the academic resilience of Uzbek students.

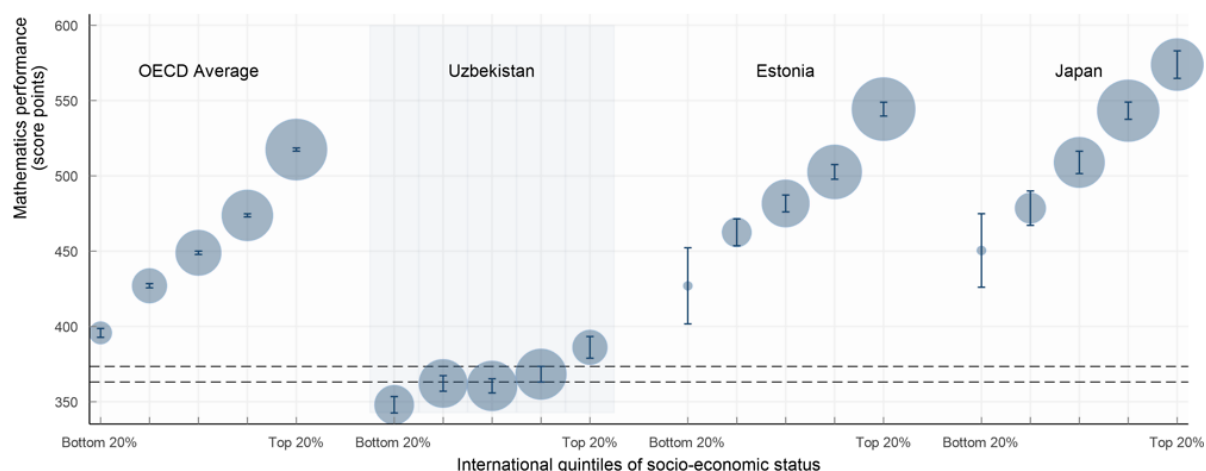


Figure 3. Mean performance in mathematics, by international quintiles of socio-economic status of Uzbekistan

Source: OECD (2023), PISA 2022 RESULTS: FACTSHEETS – UZBEKISTAN. OECD publishing, Paris, <https://bit.ly/3DR0AwM>

According to the results of the OECD average, and countries like Japan and Estonia, the students' performance improved when their socio-economic background increased. The socio-economic status has not much affected the results of students from Uzbekistan. It can be concluded that the socio-economic opportunities did not give much advantage to the students of Uzbekistan. Another conclusion is that the problem is not related to families' spending on education, but the main issue is education itself.

Similar results can be seen in the Kazakhstani students' performance. In Kazakhstan, socio-economically advantaged students (the top 25% in terms of socio-economic status) outperformed disadvantaged students (the bottom 25%) by 41 score points in mathematics (Figure 4).

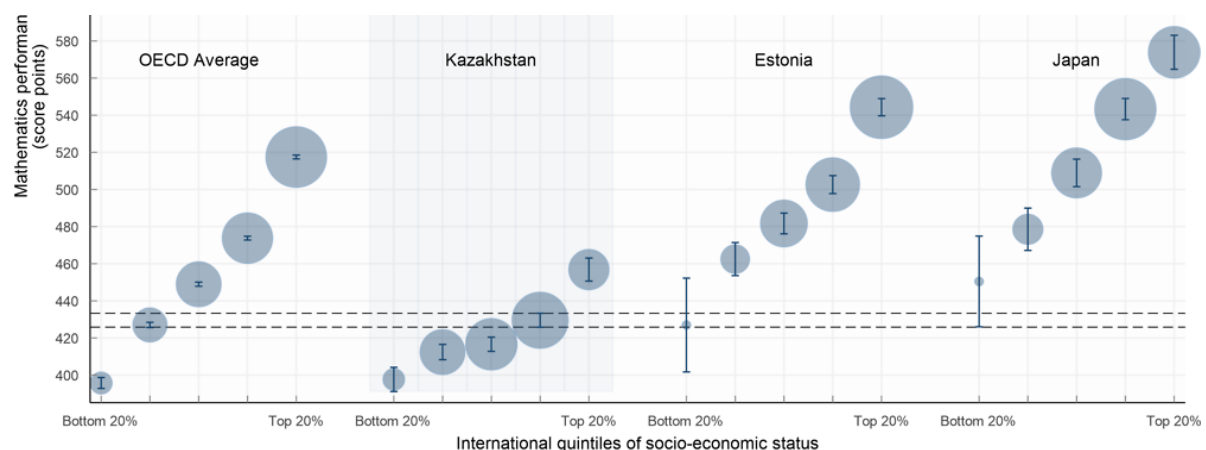


Figure 4. Mean performance in mathematics, by international quintiles of socio-economic status of Kazakhstan

Source: OECD (2023), PISA 2022 RESULTS: FACTSHEETS – KAZAKHSTAN. OECD publishing, Paris, <http://bit.ly/3W9b2Gb>

Although this result was higher than that of Uzbekistan, it was lower than the OECD average. Some 17% of disadvantaged students in Kazakhstan were able to score in the top quarter of mathematics performance. There was a slight difference from the results of Uzbekistan, but this was higher than the OECD average. These results show that the academic resilience of Kazakh students was a little lower than that of Uzbek students, and the difference in their socio-academic status impacted their performance in mathematics. However, Kazakhstan is one of the countries that differ from the OECD countries and economies.

Creativity

The OECD released other reports related to the PISA-2022 study in 2024. One of them is about assessing the creative thinking ability of students. The test explores how well students can generate diverse and creative ideas, and how well they can evaluate and improve others' ideas to reach creative outcomes.

Uzbekistan was among the five countries that had the lowest performance in creative thinking (OECD, 2024, p. 24). Kazakh students scored lower than the OECD average, with 24 out of 60 possible points in creative thinking (OECD, 2024, p. 2). With a mean score of 14 out of 60 possible points, students in Uzbekistan scored significantly lower than the results of Kazakhstan. The smallest variation in creative thinking performance between students in the 90th percentile and the 10th percentile is found in Latvia and Uzbekistan (22 points). The students in the 90th percentile scored higher in Kazakhstan. These score points show that Uzbekistan should focus on developing creative thinking in the education system.

After accounting for students' mathematics performance, Uzbek students scored nearly 6 points lower in creative thinking than expected. The figures for Kazakh students were 3 points. While Kazakh students performed as expected in reading, 15-year-old students of Uzbekistan scored 4 points lower than expected (OECD, 2024, p. 88).

20% of disadvantaged students in Uzbekistan were academically resilient in creative thinking. It was the highest result among participating countries. The share of academically resilient students of Kazakhstan was 18 %. Kazakhstan ranked fourth among the OECD countries (OECD, 2024, p. 114).

The differences in the performance of advantaged and disadvantaged students were non-significant in "evaluate and improve ideas" tasks, "generate creative ideas" tasks, and visual expression tasks in Uzbekistan. Advantaged students significantly outperformed disadvantaged students in all but Uzbekistan in social problem-solving contexts. Furthermore, Uzbekistan is one of four countries in which advantaged students did not outperform disadvantaged students in scientific problem-solving contexts (OECD, 2024, pp. 150-151).

The school principals in Kazakhstan and Uzbekistan held very favourable views on their teachers' use of creative thinking pedagogies (OECD, 2024, p. 189).

Uzbekistan was one of the top five countries in which its students reported the highest frequency of participation in various activities at school (Table 2). In this case, even though Uzbek students' performance in various school activities, the results of these activities have not been reflected in the creative thinking results of the PISA study. The efficiency of school activities is not as expected. There might not be enough creative thinking pedagogy or they might be held just for formality (OECD, 2024, p. 195). There should be more creative activities

which might lead to well-being of young adults. One research revealed that people felt more enthusiasm and hisgher flourishing following days when they were more creative than normal (Conner et al., 2016, p. 186). Empirical studies indicate that engaging in spontaneous dance or theatrical improvisation may enhance children's creativity, with a particular emphasis on the development of divergent thinking skills (Clarke & Basilio, 2018, p. 102). These studies highlight the importance of schoolchildren's participation in various school activities. However, such activies should be structured with a greater focus on fostering creative thinking skills.

Table 2. The percentage of Kazakh and Uzbek students who reported that they participate in various school activities

Countries	Percentage of students who report that they participate in the following activities in their school at least once a week							
	Art classes/activities (e.g. painting, drawing)	Music classes/activities (e.g. choir, band)	Computer programming classes/activities	Creative writing classes/activities	Science club	Drama, theatre classes/activities	Debate club	Publications (e.g. newspaper, yearbook, literary magazine)
	%	%	%	%	%	%	%	%
Kazakhstan	33	27	34	34	23	23	27	23
Uzbekistan	33	33	39	35	45	32	34	33

Note: compiled based on data from OECD (2024), PISA 2022 Results (Volume III): Creative Minds, Creative Schools, PISA, OECD Publishing, Paris, <https://doi.org/10.1787/765ee8c2-en>.

Learning strategies

PISA provides important insights into how well 15-year-olds are prepared for learning beyond compulsory schooling. The data shed light on how students adopt and use key learning strategies; how motivated they are to learn; and how confident they are that they can acquire, synthesise, and employ new knowledge through study and effort. The results of the questionnaire about learning strategies can help come to some conclusions. One of the questions revealed that the percentage of students responding that they ask questions when they do not understand the mathematics material being taught, at least more than half of the time. More than 50 % of Kazakh students and 60 % of Uzbek students responded to this question positively. There is no big difference between top performers and low performers who answered positively to this question. In Uzbekistan, more than 70 % of skilled performers responded that they asked questions when they did not understand, and about 55 % of low performers responded in the same way (OECD, 2024, p. 58). Although asking questions when the students do not comprehend the lesson is not a significant aspect of learning, this might affect students' overall performance. However, despite Kazakhstan achieving better results, Uzbekistan's performance in mathematics has not shown significant improvement. Another question was about the percentage of students

responding whether they check (or not) their homework before submitting, among those who agree/strongly agree they make sure there are no mistakes. 88 % of Uzbek students responded that they check their homework before submission, while the figure for Kazakhstan was 71 % (OECD, 2024, p. 63). It shows that doing homework and preparing for lessons might not affect them greatly. In the lowest-performing countries like Cambodia and Uzbekistan, nearly 90 % of students reported that they checked their homework before submission. These results show that the problems in school education might prevent them from achieving high performance, even when the students are well-prepared for the lesson.

Even though Uzbek students answered positively to many other questions about learning strategies, this has not been reflected in their mathematics performance. For instance, more than 60% of students reported that they can confidently solve mathematical tasks in real-life contexts in Uzbekistan. Moreover, Uzbekistan has the highest share with 69% of students reporting mathematics as one of their favourite subjects (OECD, 2024, p. 94-95). The results of responses to the questions reveal that students' interest in the subject and being active in classrooms are not enough to attain high results.

Furthermore, 80 % of students on average responded that they love learning new things at school in Uzbekistan, while only skilled performers answered the same in Kazakhstan. The PISA 2022 study included questions about students' future plans. Almost 60% of students reported feeling pressure from family to follow a specific path after finishing compulsory education in Uzbekistan. More than 80% of 15-year-old Uzbek students in OECD countries know what job they want to do by the time they are 30 (OECD, 2024, pp. 128-130). Despite having clear plans for the future, low results show that there are problems in the education system of Uzbekistan.

The responses to another question show that over 40% of students in Uzbekistan reported being frequently asked to interpret mathematical solutions in the context of a real-life challenge. It was 2 times higher than that of the OECD average. However, this factor was not enough to achieve high results in Uzbekistan.

Another factor that might influence students' results is school climate. This issue has already been studied by Kazakhstani researchers on the basis of PISA-2018 results. One study reveals that school climate which includes student disruptive behavior, teacher enthusiasm and student learning, sense of belonging at school plays important role in the results of students. According to this study, it requires the active participation of all stakeholders to create safe learning environment at schools (Akhmetov, 2021, p.13). Therefore, there should be some researches about creating school climate for better learning in Uzbekistan.

Conclusions

Central Asian countries made several reforms to modernize their education system and implement international standards during the Post-Soviet era. One of these reforms was introducing the PISA international assessment study in Kazakhstan and Uzbekistan. The significance of participating in the PISA study is that it might create an opportunity to learn about actual problems in general secondary education. Analyzing the performance of Kazakhstan and Uzbekistan in the PISA study might help come to some conclusions:

1. Kazakhstan was the first among Central Asian countries to participate in the PISA study. The performance in 2009, 2012, 2015, 2018, and 2022 registered a slight rise. Generally, if the reforms are continued successfully, the students of this country might achieve the average results of the OECD countries and economies. Although Kazakhstan has become successful with its modern reforms in general secondary education, these reforms should be continued and developed. For this purpose, doing research and learning about other countries' experience are essential.

2. Uzbekistan participated in the PISA study for the first time in 2022. The results of the first participation were not satisfactory, nevertheless, this performance helped to find out the current problems in the education system of Uzbekistan. Uzbekistan might improve its results by finding solutions to these problems.

3. Both Central Asian countries have the same memorization-oriented education system left from the soviet era, and there are some issues in applying knowledge in real-life situations. The inadequacy of students' abilities to apply their knowledge in practice is related to focusing only on memorization during the lessons. Uzbekistan should pay attention to continue its reforms on modernizing its education system, oriented to developing thinking skills of the students, and international experience should be learned in this area.

4. Both Central Asian countries are reforming their education systems to create an education system based on international standards. The participation in the PISA studies has the same purpose.

5. Uzbekistan should learn from the experience of Kazakhstan to improve its results in the PISA study. Studying the reforms made by the Kazakh government in its education system and learning the opportunities to implement them in Uzbekistan might also help to achieve higher results.

6. Social-economic opportunities for the students' families could not help the students perform better than the disadvantaged ones in Uzbekistan. This shows that the problems are related to the education system itself, not the financial situation of the students. Having academically resilient students means that there are enough gifted students who can show their abilities through modernized education.

7. According to the conclusions of the PISA study, there might be high results by giving more authority and autonomy to schools and teachers. Therefore, the perspectives of people in society, mainly, the responsibility for teaching and trust for teachers and schools, should be changed.

Drawing on the conclusions outlined above, several actionable recommendations can be proposed. Both Uzbekistan and Kazakhstan should sustain their education reforms aimed at aligning with international standards, with particular emphasis on comprehensive preparation for upcoming PISA cycles. It is critical that schools not only familiarize students with PISA-related content but also emphasize the practical application of acquired knowledge and skills. Furthermore, extracurricular activities and supplementary lessons should be reoriented from formal procedures toward fostering students' creative thinking abilities. Future research is encouraged to conduct in-depth analyses of specific PISA domains, which may provide valuable insights into systemic challenges within the education sectors of both countries and inform evidence-based policy development.

Conflict of interest

No potential conflict of interest was reported by the author(s).

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PISA халықаралық бағалау зерттеуіне Өзбекстан мен Қазақстанның қатысуын талдау

Аңдатпа. Бұл мақала Орталық Азияның екі елі PISA халықаралық бағалау зерттеуіне қатысуын талдауға арналған. Қазақстан мен Өзбекстан тәуелсіздік алғаннан кейін білім беру жүйесіне шетелдік тәжірибені жаңғырту мен енгізуді қолға алғанын ескерген жөн. Екі ел де өз реформаларының нәтижелерін бағалау үшін жалпы орта білім беру жүйесін бағалауы керек еді. Қазақстан 2009 жылы PISA-ға қатысу арқылы алғашқы қадамын жасады. Өзбекстан PISA-2022 зерттеуіне алғаш рет ғана қатыса бастады. Екі елдің құжаттарын жүйелі талдау олардың алдағы уақытта бұл зерттеуде жоғары нәтижелерге қол жеткізуді жоспарлағанын көрсетеді. PISA-2022 нәтижелері бойынша екі елдің салыстырмалы талдауы және олардың бұл халықаралық зерттеуге дайындық деңгейі білім беру жүйесіндегі мәселелерді анықтауға мүмкіндік берді. Бұл мақалада екі елдің нәтижелеріне ықпал еткен факторлар да зерттелді. PISA-2022 зерттеуі туралы OECD жасаған есептерді талдау кейбір қорытындыларға келуге көмектесті. Тарихи шолу арқылы посткеңестік елдердегі жалпы орта білім беру мәселелерінің шешімін табу осы мақаланың негізгі мақсаттарының бірі болып табылады.

Түйін сөздер: PISA, OECD, Қазақстан, Өзбекстан, оқу, математика, жаратылыстану, шығармашылық, білім беру реформалары, жалпы орта білім, халықаралық бағалау

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Анализ участия Узбекистана и Казахстана в международном оценочном исследовании PISA

Аннотация. Эта статья посвящена исследованию участия двух стран Центральной Азии в международном оценочном исследовании PISA. Важно отметить, что Казахстан и Узбекистан начали модернизировать и внедрять зарубежный опыт в свою систему образования после обретения независимости. Обе страны должны были провести оценку своей системы общего среднего образования, чтобы проанализировать результаты проведённых реформ. Казахстан сделал свой первый шаг, приняв участие в PISA в 2009 году. Узбекистан только начал это участие в оценочном исследовании PISA-2022. Систематический анализ документов обеих стран показывает, что они планируют достичь более высоких результатов в этом исследовании в ближайшем будущем. Сравнительный анализ результатов PISA-2022 обеих стран и их подготовка к этому международному исследованию помогли выявить проблемы, связанные с их системой образования. В данной статье также были изучены факторы, способствовавшие результатам обеих стран. Анализ докладов, подготовленных ОЭСР по исследованию PISA-2022, помог прийти к некоторым выводам. Поиск решений проблем общего среднего образования в постсоветских странах путем исторического обзора является одной из основных целей данной статьи.

Ключевые слова: PISA, OECD, Казахстан, Узбекистан, чтение, математика, наука, творчество, образовательные реформы, общее среднее образование, международная оценка.

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