PISA as a Mirror of Education Quality: Achievements of Kyzylorda Region and the Outlook for 2025

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Abstract

This paper investigates how Programme for International Student Assessment (PISA) influences the educational advancement of Kazakhstan in general and Kyzylorda region in particular. The main focus is to evaluate how the region fared in the 2022 PISA results – and what that means for future policy directions. Against a largely tenuous past, Kyzylorda saw an even larger 28-point gain in science literacy, with the proportion of low-performing students also decreasing by 18%. This milestone reflects the region's successful educational reforms that adopt strategic support for struggling students and focus on inclusive models of teaching. It was a qualitative analysis based on the region s PISA results over the comparison to national standards and a comparison to international standards. The study shows that the gains in scientific literacy are aligned with international standards for best practices, especially in terms of the types of striving PISA countries. The paper reiterates the need for local education policy to reflect PISA's principles, and highlights the role of even stronger science literacy in supporting performance in PISA 2025. The findings point to the need for ongoing attention to functional literacy, teacher preparation and evidence-based reforms that can secure lasting educational gains. This research study adds to the literature on the usage of international assessments to inform educational reforms in developing contexts.

Keywords: PISA, educational reform, Kazakhstan, Kyzylorda, science literacy, international assessments, educational policy, functional literacy, PISA 2025.

1. Introduction

Education is one of the most fundamental pillars of societal development, influencing everything from economic growth to social mobility, and providing the foundation for individual empowerment. As the world becomes increasingly interconnected, the importance of ensuring that education systems are capable of equipping students with the necessary skills and knowledge to thrive in an ever-evolving global landscape has never been more urgent. With the increasing demand for highly skilled labor and the rapid pace of technological innovation, countries across the globe are turning to international assessments to gauge the effectiveness of their education systems and guide policy decisions [1]. One such assessment is the Programme for International Student Assessment (PISA), administered by the Organisation for Economic Co-operation and Development (OECD). PISA is considered one of the most influential and comprehensive tools for evaluating the quality of education worldwide, and it provides invaluable insights into the educational outcomes of 15-year-old students in various countries [2].

Kazakhstan, a country located at the crossroads of Central Asia, has undergone significant educational reforms over the past few decades. Recognizing that human capital is a critical driver of economic and social progress, the government of Kazakhstan has made concerted efforts to improve the quality of education across the country [3]. The results of the PISA assessments, which have been conducted every three years since 2000, have played a crucial role in shaping these reforms. By evaluating the academic performance of students in core areas such as reading, mathematics, and science, PISA offers a clear indication of how well students are prepared for the challenges of adulthood. In the context of Kazakhstan, PISA provides a benchmark against which the country can assess its progress in education, identify areas of improvement, and set goals for future development [4], [5].

While Kazakhstan as a whole has faced challenges in meeting the international benchmarks set by PISA, the country has also made significant strides in improving its educational system, particularly in the areas of science literacy and STEM education (science, technology, engineering, and mathematics). One of the most notable examples of success is the Kyzylorda region, which has demonstrated impressive improvements in recent PISA results. Kyzylorda, once a region marked by low educational performance, has seen a remarkable transformation, particularly in science literacy, with the region's students achieving a 28-point increase in their science scores between 2018 and 2022. This achievement not only highlights the effectiveness of the region's educational reforms but also positions Kyzylorda as a model for other regions in Kazakhstan and beyond [6].

The 2022 PISA results for Kyzylorda mark a turning point for the region's educational trajectory, as it reflects the successful implementation of key reforms aimed at improving educational outcomes. These reforms include the introduction of inclusive education models, which prioritize equitable learning opportunities for all students, as well as targeted interventions to support low-performing students. The 18% reduction in the proportion of low-performing students in Kyzylorda is a testament to the success of these strategies and suggests that the region is on the right path toward improving its educational standards. This paper seeks to analyze the role of PISA in shaping the educational policies and reforms in the Kyzylorda region and to explore how these results can inform the ongoing development of the education system in Kazakhstan [7], [8], [9].

The Role of PISA in Educational Reform

PISA is widely regarded as one of the most effective tools for assessing the quality of education across countries. Unlike traditional tests that focus solely on academic knowledge, PISA emphasizes the application of knowledge in real-world contexts. It assesses not only students' ability to perform academic tasks but also their capacity to apply their learning in practical situations [1]. This focus on functional literacy makes PISA an invaluable tool for understanding how well students are prepared to face the challenges of adulthood, including those related to employment, citizenship, and lifelong learning. By measuring students' competencies in reading, mathematics, and science, PISA provides a holistic picture of their academic abilities, as well as their capacity to navigate complex problems and make informed decisions [7].

In Kazakhstan, PISA results have become an essential part of the education policy framework. The country's participation in PISA has provided policymakers with valuable data on the strengths and weaknesses of the education system, allowing them to make evidence-based decisions about how to improve educational outcomes. The government of Kazakhstan has used PISA results to identify key areas for reform, such as the need to enhance literacy levels, improve teaching methodologies, and strengthen the focus on STEM education. PISA has also been instrumental in shifting Kazakhstan's educational system toward a more inclusive and equitable model, ensuring that all students, regardless of their background, have access to high-quality education [10].

In particular, the Kyzylorda region has embraced the insights provided by PISA to drive its educational reforms. As one of Kazakhstan's more historically underperforming regions, Kyzylorda faced significant challenges in improving its educational standards. However, the region's PISA 2022 results have demonstrated the success of the reforms implemented over the past few years [11]. The 28-point increase in science literacy and the reduction in low-performing students highlight the effectiveness of these changes and provide a model for other regions to follow. The success of Kyzylorda underscores the importance of evidence-based educational reforms and the role that international assessments like PISA can play in shaping a more effective and inclusive education system [12].

Educational Reforms in Kazakhstan and the Focus on STEM

Kazakhstan's educational reforms have been driven by the recognition that the country's future economic success is tied to its ability to develop a highly skilled workforce. The government has prioritized science, technology, engineering, and mathematics (STEM) education, recognizing that these fields are critical for the country's continued development in the digital age. STEM education plays a key role in preparing students for the jobs of the future, where proficiency in subjects like science and technology is becoming increasingly important. The improvement of science literacy in Kyzylorda is a direct result of the region's focus on enhancing STEM education, which has been supported by various policy initiatives at both the regional and national levels [13].

One of the key factors in the success of Kyzylorda's educational reforms has been the introduction of inclusive education models. These models prioritize the needs of all students, including those who are at risk of falling behind. By providing targeted support for low-performing students, Kyzylorda has been able to reduce the gap between high and low achievers, ensuring that all students have an equal opportunity to succeed. This focus on equity in education has been central to the region's progress, as

it ensures that no student is left behind, regardless of their socio-economic background or academic ability [12].

Looking Ahead: PISA 2025 and the Future of Education in Kazakhstan

As Kazakhstan prepares for the next round of PISA testing in 2025, the lessons learned from the Kyzylorda region's successes will be invaluable. The 2025 cycle of PISA will place a strong emphasis on scientific literacy, with a focus on global challenges such as sustainability, technology, and society. Kyzylorda, having already made significant strides in science literacy, is well-positioned to continue its progress and serve as a model for other regions. However, there is still much work to be done to ensure that the improvements achieved so far are sustainable and that further progress is made in other areas, such as mathematics and reading literacy [14], [15].

In order to maintain its momentum and build on the success of the 2022 PISA results, Kyzylorda will need to continue investing in teacher training, curriculum development, and assessment practices that align with international best practices. The region must also focus on integrating more practical and lab-based learning activities into its science curriculum, helping students develop a deeper understanding of scientific concepts and their real-world applications. With a focus on evidence-based reforms and the continued support of international assessments like PISA, Kyzylorda can continue to improve its education system and provide its students with the skills and knowledge they need to succeed in the 21st century [13].

2. Research Method

Based on the qualitative analysis of the PISA 2022 results of Kyzylorda region in Kazakhstan in terms of primary educational indicators (science literacy, and the proportion of students with low achievement) this study has a methodology. The research draws on secondary data from the official reports of the OECD and Kazakhstan Ministry of education, and from the available academic literature that relates to international assessments and educational reforms. The first method is an in-depth analysis of the PISA results in order to discover student performance trends and to assess how successful the region has been at implementing educational reforms. Data were analyzed both quantitatively (the Kyzylorda results were compared with national averages and with results from other regions of Kazakhstan) and qualitatively. This enables to have a better insight into what Kyzylorda has managed to achieve and where it lags behind. It goes on to contextualize the progress in the region in the light of global trends in education, using international best practices, notably from high-performing PISA countries. To comprehend the sliced results of PISA, the study also elaborates on the policy changes employed in Kyzylorda such as targeted support for the low-performing students and the introduction of inclusive teaching models. It also involves interviews with regional education professionals and policymakers to gain insights on the overall challenges and victories of the region's educational framework. This mixed-methods strategy provides an in-depth comprehension of the findings leads to regions in terms of policy and what that might mean for reforms in these regions before the PISA 2025 cycle.--The graph above is taken from the full report.

3. Result and Discussion

The Programme for International Student Assessment (PISA) results have become an essential tool for policymakers across the world to evaluate the effectiveness of their educational systems. For Kazakhstan, PISA serves not only as a benchmark against global educational standards but also as a tool to refine its national and regional education policies. The significant improvement in the educational outcomes of the Kyzylorda region in the 2022 PISA assessment provides a compelling case for the success of educational reforms implemented in the region. This section provides an in-depth analysis of the 2022 PISA results for Kyzylorda, focusing on the improvements in science literacy, the reduction in low-performing students, and the strategic insights that can guide future educational practices in Kazakhstan.

Overview of PISA 2022 Results for Kyzylorda Region

In the PISA 2022 assessment, the Kyzylorda region showed marked improvements, particularly in the area of science literacy, a critical domain for assessing students' preparedness to face the challenges of adulthood in a world increasingly driven by technology and innovation. The region achieved a 28-point increase in science literacy compared to the 2018 results, which was the most significant improvement observed in any region of Kazakhstan. This gain is not only statistically significant but also represents a paradigm shift in the region's educational trajectory, as science literacy had previously been a weak point in Kyzylorda's education system.

In addition to the improvement in science literacy scores, the proportion of low-performing students in Kyzylorda decreased by 18%. This achievement highlights the success of the region's inclusive

educational models, which have focused on providing targeted support for struggling students. The reduction in the number of low-performing students suggests that the region's educational reforms have been effective in addressing disparities in academic performance, thus fostering a more equitable learning environment.

Despite these improvements, however, it is important to note that the region's performance in mathematics was slightly lower in 2022 compared to the previous assessment, signaling that further attention is needed in strengthening mathematical literacy. Additionally, while reading literacy scores remained stable, there is an ongoing need to reinforce text comprehension and problem-solving skills, as these competencies are essential for success across all academic domains.

Success of Educational Reforms in Kyzylorda

The positive outcomes in the PISA 2022 results for Kyzylorda can largely be attributed to the comprehensive educational reforms introduced in the region over the past few years. These reforms have centered on inclusive education, equitable learning opportunities, and targeted support for low-performing students, which have contributed to the overall improvement in student performance. The following are key factors that have influenced the success of these reforms:

1. Inclusive Education Models

Inclusive education is one of the central pillars of the educational reforms in Kyzylorda. These models prioritize the educational needs of all students, including those who have been traditionally underserved or who are at risk of academic failure. By providing additional resources, support services, and differentiated instruction, inclusive education models aim to ensure that all students, regardless of their background or learning abilities, can succeed academically.

The reduction in the number of low-performing students in Kyzylorda can be directly attributed to the implementation of these inclusive education models. The 28-point gain in science literacy, for example, is a testament to the region's commitment to improving the educational outcomes of students who were previously falling behind. The targeted interventions, such as extra tutoring, individualized support, and the use of alternative teaching strategies, have helped bridge the achievement gap between high-performing and low-performing students.

2. Teacher Training and Professional Development

Another key factor contributing to the success of Kyzylorda's educational reforms has been the investment in teacher training and professional development. Effective teaching is the cornerstone of any successful education system, and Kyzylorda has made significant efforts to improve the skills and competencies of its educators. Professional development programs have been designed to help teachers adopt new teaching methods, integrate technology into their classrooms, and better support diverse student needs.

The focus on improving teacher competencies has had a direct impact on the quality of education in the region. Teachers have become better equipped to address the needs of their students, particularly those who require additional support. This enhanced capacity among teachers has contributed to the overall improvement in student performance, particularly in areas like science literacy, where teachers have received targeted training in inquiry-based and hands-on learning methods.

3. Data-Driven Decision Making

The use of data-driven decision making has also played a crucial role in the success of Kyzylorda's educational reforms. By utilizing data from the PISA assessments and other local assessments, the region's education policymakers have been able to identify areas of strength and weakness in the education system. This evidence has allowed for the development of more targeted policies and interventions aimed at improving student outcomes.

For instance, the region's focus on improving science literacy was informed by the data from previous PISA cycles, which showed that science had been a weak point for Kyzylorda students. In response, the region implemented specific strategies, such as enhancing the science curriculum, providing additional resources for science teachers, and fostering a culture of inquiry and problem-solving among students. The results from PISA 2022 demonstrate the effectiveness of these targeted interventions.

Comparing Kyzylorda's Progress with National and International Standards

The progress made by Kyzylorda is even more impressive when viewed in comparison to both national standards and international benchmarks. Nationally, Kazakhstan has faced significant challenges in meeting the OECD-wide benchmarks set by PISA, with the country consistently performing below the international average in key areas such as reading, mathematics, and science literacy. However, Kyzylorda's performance in 2022 represents a dramatic improvement, particularly in the area of science literacy, where the region's scores outpaced national averages.

Internationally, Kyzylorda's achievements are consistent with the best practices observed in top-performing countries such as Singapore, South Korea, Finland, and Japan. These countries

consistently rank among the top performers in PISA assessments, owing to their strong emphasis on evidence-based reforms, equitable access to high-quality education, and teacher professionalization. Kyzylorda's improvements in science literacy align with these global trends, suggesting that the region's educational reforms are heading in the right direction.

Despite these successes, it is important to recognize that Kyzylorda still faces significant challenges in areas such as mathematics and reading literacy, where the region's performance has remained relatively stable or slightly declined. This highlights the need for continued investment in these areas, as well as the importance of maintaining momentum in the region's educational reforms.

Challenges and Areas for Further Improvement

While the 2022 PISA results for Kyzylorda are largely positive, several challenges remain. The slight decline in mathematics performance and the stable reading literacy scores indicate that there are still areas where the region must focus its efforts. In particular, mathematical literacy is a critical skill that students will need to succeed in an increasingly data-driven and technologically advanced world. To address this, Kyzylorda will need to implement additional strategies to strengthen students' mathematical problem-solving abilities and enhance their ability to apply mathematical concepts in real-world contexts.

In addition, while the region has made great strides in science literacy, there is still a need to further integrate practical and hands-on learning experiences into the science curriculum. Science education should not only focus on theoretical knowledge but also on the development of critical thinking, problem-solving, and experimentation skills. Expanding laboratory-based learning opportunities, encouraging student-driven research projects, and integrating technology into science lessons are all essential steps to improving the quality of science education in Kyzylorda.

Moreover, reading literacy remains an area for continued improvement. Despite the region's stable performance in reading literacy, there is a need to strengthen students' text comprehension and critical thinking skills. By promoting deeper engagement with texts and encouraging students to analyze and evaluate information more effectively, Kyzylorda can further enhance its students' reading proficiency and their ability to navigate complex texts across various academic disciplines.

Strategic Outlook for PISA 2025 and Beyond

Looking ahead to the PISA 2025 cycle, which will place a stronger emphasis on scientific literacy, Kyzylorda is well-positioned to build on its success. However, the region must continue to focus on consolidating its gains and addressing areas where performance remains weaker. As the 2025 PISA cycle approaches, the following strategies can help Kyzylorda continue to improve its educational outcomes:

Strengthening Mathematics Education: Focus on enhancing mathematical literacy through targeted interventions, such as tutoring programs, teacher training in mathematics, and the development of problem-solving skills.

Expanding Practical Science Education: Increase the emphasis on hands-on learning in science classes, integrate digital tools, and promote inquiry-based learning to help students develop a deeper understanding of scientific concepts.

Improving Teacher Training: Continue to invest in the professional development of teachers, particularly in areas such as STEM education and inclusive teaching practices, to ensure that educators are equipped to meet the needs of all students.

Fostering Reading Literacy: Enhance reading comprehension skills by encouraging critical reading and analysis, integrating cross-disciplinary reading strategies, and providing students with diverse reading materials.

In conclusion, the PISA 2022 results for Kyzylorda represent a remarkable success story in the context of Kazakhstan's educational reforms. The region's improvement in science literacy, reduction in low-performing students, and alignment with international best practices offer valuable insights into how evidence-based educational policies can lead to significant improvements in student outcomes. However, continued efforts will be necessary to address the challenges that remain and ensure that the gains achieved in Kyzylorda are sustained in the future.

4. Conclusion and Recommendation

In summary, the key findings of the 2022 PISA of the Kyzylorda region noticed a greater accomplishment in science literacy area. The 28-point gain in science literacy and the decrease in low-performing students are concrete measures of how the region has done in reforming education. These results are encouraging, but there is still a mountain to climb to make sure that progress is maintained and consolidated. We need to keep working on scientific literacy, with attention on some declines in mathematics, while hoisting up the performance in reading literacy where it is strong. With this in mind,

the upcoming round of PISA 2025 is a key moment for Kyzylorda to build on these gains and work to improve its already laudable science performance. Kyzylorda can ensure that its students are able to thrive as active citizens and prepare for life after school by remaining committed to quality education, adopting evidence-based policies and further aligning with international best practice.

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