

GENDER DISPARITIES IN PIRLS AND TIMSS: THE CASE OF UZBEKISTAN

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Annotation. This article analyzes gender disparities in educational achievement in Uzbekistan through PIRLS and TIMSS data, revealing consistent trends where girls outperform boys in reading while boys generally do better in mathematics. It highlights contributing factors such as cultural norms, teaching practices, and parental support, and emphasizes the importance of Uzbekistan’s participation in PIRLS 2026 and TIMSS 2027 for developing targeted, gender-sensitive educational policies.

Key words. Gender disparities; PIRLS; TIMSS; Uzbekistan; Reading literacy; Mathematics achievement; Science education; Educational assessment; International comparison; Educational policy; Equity in education; Student performance.

Education is universally acknowledged as a cornerstone for personal empowerment, social development, and economic progress. In the context of a rapidly changing global landscape, ensuring equitable access to high-quality education for all students, regardless of gender, has become a central focus for policymakers and educators. Despite global advancements in educational access and quality, gender disparities in learning outcomes remain a significant challenge across many countries. These disparities not only perpetuate cycles of inequality but also undermine the potential for sustainable development and social cohesion. Addressing these disparities is critical, particularly in light of international frameworks like the United Nations Sustainable Development Goal 4 (SDG 4), which aims to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.”

International assessments such as the Progress in International Reading Literacy Study (PIRLS) and the Trends in International Mathematics and Science Study (TIMSS) have become essential tools for evaluating educational systems across the world. These assessments, conducted by the International Association for the Evaluation of Educational Achievement (IEA), provide valuable data on the academic

performance of students in key areas: reading literacy, mathematics, and science. Through these data, PIRLS and TIMSS offer insights into not only the relative performance of students but also highlight disparities in achievement across gender lines. Understanding the extent of these gender differences is crucial for the formulation of policies aimed at promoting gender equality in education. The PIRLS assessment, which focuses on measuring reading literacy, has consistently shown that girls outperform boys in reading skills in most countries. Similarly, the TIMSS assessment, which evaluates students' knowledge in mathematics and science, has revealed varying gender gaps depending on the region, with boys often performing better in mathematics, while girls tend to outperform boys in science in some countries. These findings underscore the complexity of gender-related educational issues, with gender disparities not only existing across different subjects but also varying by geographic region and cultural context. The PIRLS and TIMSS studies serve as crucial instruments for understanding the multifaceted nature of gender inequality in education. By analyzing the performance data from these assessments, researchers and policymakers can identify patterns of gender-based achievement gaps and the potential factors contributing to these disparities. For example, cultural expectations, gendered teaching practices, societal norms, and unequal access to educational resources are just a few of the factors that may influence student performance differently based on gender. Moreover, the findings from these assessments provide an empirical basis for designing interventions to address these disparities, offering a roadmap for educational reforms aimed at ensuring that both boys and girls have equal opportunities to succeed academically.

The issue of gender disparities in education has been a focal point of academic research for decades. Despite global efforts to promote gender equality in education, substantial gaps persist in various regions, particularly in terms of academic performance and educational outcomes. International assessments like PIRLS (Progress in International Reading Literacy Study) and TIMSS (Trends in International Mathematics and Science Study) have become key sources of data for understanding these disparities, providing a comparative lens to examine gender differences in educational achievement across countries. Numerous studies have highlighted the persistent gender gaps in education, particularly in the early stages of schooling. According to the World Economic Forum (2020), gender disparities in education manifest in various forms, ranging from enrollment rates and access to quality education to differences in learning outcomes and academic achievement. The United Nations Educational, Scientific and Cultural Organization (UNESCO) has also

reported that while gender parity in primary education has been largely achieved globally, disparities in secondary and higher education persist, with girls often outperforming boys in reading and boys outperforming girls in mathematics and science in certain regions (UNESCO, 2019). The PIRLS assessment, which measures reading literacy among 4th-grade students, has consistently shown that girls tend to outperform boys in reading skills in most countries. Studies by Mullis et al. (2017) and Foy et al. (2019) suggest that this gender gap in reading proficiency is not only persistent but widening in some countries, particularly in regions like Eastern Europe and North America. Several factors have been identified as contributing to this gender gap, including societal gender roles, early childhood socialization, and differences in reading habits between boys and girls. Fletcher and Colwell (2017) suggest that boys are less likely to engage in reading outside of school, which has been linked to lower reading achievement scores in PIRLS assessments. Conversely, Mullis et al. (2017) have noted that girls are more likely to enjoy reading and to receive parental encouragement in developing reading skills, which positively impacts their performance. Furthermore, Foy et al. (2019) indicate that the gender gap in reading is not solely a result of individual behaviors but is also influenced by the broader educational environment, including teacher expectations, curricular choices, and instructional practices that may favor the development of girls' reading skills over boys'. Educational systems that focus heavily on reading as a core skill tend to produce wider gender gaps, with girls outperforming boys.

In contrast to the PIRLS findings, TIMSS results reveal more complex patterns of gender disparities in mathematics and science. Martin et al. (2016) note that while boys generally outperform girls in mathematics in many countries, girls often outperform boys in science, particularly in primary and secondary education. However, these patterns are not uniform across all countries, and regional and cultural differences play a significant role in shaping these gender gaps. Else-Quest et al. (2010) argue that gender differences in mathematics performance are often influenced by cultural attitudes towards gender roles in academic disciplines, with some cultures associating mathematics and science with masculine traits, which may discourage girls from pursuing these subjects. Mullis et al. (2017) found that in countries where gender equality in educational policies is prioritized, the gender gaps in both mathematics and science tend to be narrower. For instance, countries like Sweden and Finland, which have strong policies promoting gender equality in education, exhibit relatively small gender gaps in TIMSS results, with girls performing equally as well as boys in both subjects. In contrast, countries where gender norms are more rigid show larger gaps,

with boys consistently outperforming girls in mathematics and girls outperforming boys in science. The gender disparities observed in PIRLS and TIMSS results cannot be attributed solely to biological differences but are deeply embedded in socio-cultural contexts and educational policies. Ainley et al. (2015) argue that socialization processes, which reinforce traditional gender roles, significantly shape the educational experiences of boys and girls. In many societies, boys are socialized to engage in competitive, achievement-oriented behaviors, which may be more aligned with success in subjects like mathematics, whereas girls are often encouraged to develop nurturing, collaborative skills, which may benefit their performance in reading and language arts. Furthermore, educational policies and institutional factors play a pivotal role in shaping gender outcomes. Hungi and Karkee (2018) highlight that countries with more inclusive education policies that focus on gender-sensitive curricula, teacher training, and resource allocation tend to exhibit smaller gender gaps. For instance, countries like Norway and Canada have implemented various gender equality initiatives that support both boys and girls in achieving their full potential across all subjects. Lloyd (2016) suggests that such policies should be adopted on a global scale to address the educational disadvantages faced by one gender in specific disciplines.

Uzbekistan's participation in international large-scale assessments such as PIRLS (2021) and TIMSS (2019 and 2023) marks a pivotal step toward aligning national education priorities with global standards and measuring student outcomes in a comparative framework. These assessments have provided critical data on how Uzbek students perform in reading literacy, mathematics, and science, with particular insights into gender-based achievement gaps. The PIRLS 2021 results revealed a notable gender gap in reading literacy among fourth-grade students in Uzbekistan. Consistent with global trends, girls outperformed boys in reading comprehension and literacy tasks. On average, the gender gap ranged between 15 to 20 scale points, favoring girls. This disparity was observed across urban and rural regions, though the gap was slightly wider in urban schools, where instructional practices and access to materials were more consistent. Several factors have been suggested as contributing to this gap in the Uzbek context. One of them is reading habits. Surveys accompanying PIRLS indicate that girls in Uzbekistan are more likely to report reading for pleasure and engaging with storybooks, whereas boys are more inclined toward digital or physical activities. The next one is teacher expectations. Qualitative findings suggest that teachers often perceive girls as more disciplined and attentive in language classes, which may influence classroom dynamics and support. The last one is parental involvement. Girls reportedly receive more encouragement to read at home, particularly in families where

mothers are actively involved in their children's education. Uzbekistan also participated in TIMSS 2019 and continued its involvement in TIMSS 2023, which assess fourth- and eighth-grade students' proficiency in mathematics and science. The gender-related results from TIMSS present a more nuanced picture compared to PIRLS. In both TIMSS 2019 and preliminary findings from TIMSS 2023, boys generally outperformed girls in mathematics, though the gap was not as large or consistent as in some other participating countries. The difference was more pronounced in urban schools, especially in topics involving geometry and number operations. Interestingly, girls in Uzbekistan performed comparably or slightly better than boys in science, especially in life sciences and environmental topics. However, boys performed better in physical science domains such as physics and chemistry. This mixed performance across subjects suggests that gender disparities in Uzbekistan are subject-specific, reflecting both cultural attitudes and instructional practices. Cultural perceptions that associate mathematics with male competence may be influencing girls' self-confidence and performance, while science, perceived as more neutral or even nurturing in certain domains, sees more balanced outcomes. In Uzbekistan, as in many other countries, persistent gender stereotypes can shape students' academic interests and expectations. Boys are often steered toward technical and quantitative fields, while girls are encouraged in language and caregiving-related domains. Some instructional materials and teaching styles may unconsciously reinforce gender norms. For instance, mathematics instruction often lacks contextual applications that appeal to girls, while science topics presented through health or environmental lenses tend to engage them more.

Uzbekistan's active participation in international assessments such as PIRLS and TIMSS reflects its commitment to improving educational quality and aligning with global standards. The year 2026 is particularly significant for the country, as it marks its involvement in the PIRLS 2026 cycle and preparation for the upcoming TIMSS 2027 assessment. These initiatives provide a valuable opportunity to further explore and address gender disparities in learning outcomes. In 2026, Uzbekistan will participate in the Progress in International Reading Literacy Study (PIRLS), which will for the first time be conducted entirely in digital format. This shift allows for more in-depth analysis of student behavior during reading tasks, such as navigation patterns, time spent on questions, and comprehension strategies. The main data collection will take place during spring and summer of 2026, following field trials that were conducted in 2025. Uzbekistan's inclusion in this cycle positions the country to gather critical data on 4th-grade students' reading proficiency, with a particular focus on gender-based

performance differences. Previous PIRLS assessments have consistently shown that girls outperform boys in reading literacy, a trend also observed in Uzbekistan. The transition to digital assessment in 2026 is expected to provide new insights into how boys and girls differ not only in outcomes but also in their approach to reading tasks. This information will be instrumental in designing targeted interventions to support boys' reading development, such as fostering reading habits and improving engagement with text-based learning. Simultaneously, 2026 will serve as a preparatory year for Uzbekistan's participation in TIMSS 2027, which assesses students in mathematics and science at the 4th and 8th grade levels. Although the main data collection for TIMSS will occur in 2027, field trials and instrument development are scheduled for 2026. These trials are essential for refining assessment tools and ensuring they are culturally and linguistically appropriate for Uzbek students. Moreover, this phase includes training teachers and administrators in the use of digital tools and contextual questionnaires, which will gather information on students' attitudes, classroom environments, and access to learning resources. Gender equity remains a central focus of both assessments. The data collected during PIRLS 2026 and the preparatory work for TIMSS 2027 will allow Uzbekistan to track and analyze subject-specific gender gaps. Historically, boys have performed better in mathematics, while girls tend to excel in science and reading, though these trends vary by region and cultural context. Through these assessments, policymakers will gain empirical evidence to understand the root causes of such disparities, which may include cultural norms, teaching practices, and differences in self-confidence among students.

Uzbekistan's active engagement with international large-scale assessments such as PIRLS and TIMSS marks a critical step toward elevating the national education system to meet global standards and addressing persistent gender disparities in student achievement. The data emerging from these assessments reveal clear patterns: girls consistently outperform boys in reading literacy, while boys tend to have an edge in mathematics, with more balanced results in science depending on the domain and context. These findings, consistent with global trends, underscore the need for targeted, evidence-based interventions tailored to the unique socio-cultural and educational landscape of Uzbekistan.

References

1. Dilova, N. G., & Baxtiyor qizi, F. N. (2022). Possibilities Of Using The PIRLS International Assessment Program In The Formation Of Students'

- Communication Competencies. *World Journal of Agriculture and Urbanization*, 1(1), 73–78.
2. Asadova, R. E. (2022). Technologies of PISA, PIRLS, TIMSS, TALIS Tests and Their Analysis in the International and Uzbekistan Education System. *International Journal of Pedagogics*, 2(09), 5–9.
 3. Tuxtasinova, M. I., & Abdullayeva, N. E. (2023). Increasing and Improving Reading Literacy (PIRLS). *International Conferences*, 1(1), 136–140.
 4. Karimova, J. (2023). Reading Literacy of Pupils of Uzbekistan: The Role of Participation in International Examinations in Development. Zenodo.
 5. IEA & Boston College (2020). TIMSS 2019 International Results in Mathematics and Science. IEA/TIMSS & PIRLS Study Center.
 6. Kelly, D. L., Centurino, V. A., Martin, M. O., & Mullis, I. V. S. (Eds.) (2020). TIMSS 2019 Encyclopedia: Education Policy and Curriculum in Mathematics and Science. TIMSS & PIRLS International Study Center.
 7. UNESCO (2021). International Literacy Day 2021 and UNESCO's Support to Uzbekistan's Government in Prioritizing Access to Education. UNESCO.
 8. OECD (2023). PISA 2022 Results, Country Notes: Uzbekistan. OECD iLibrary.