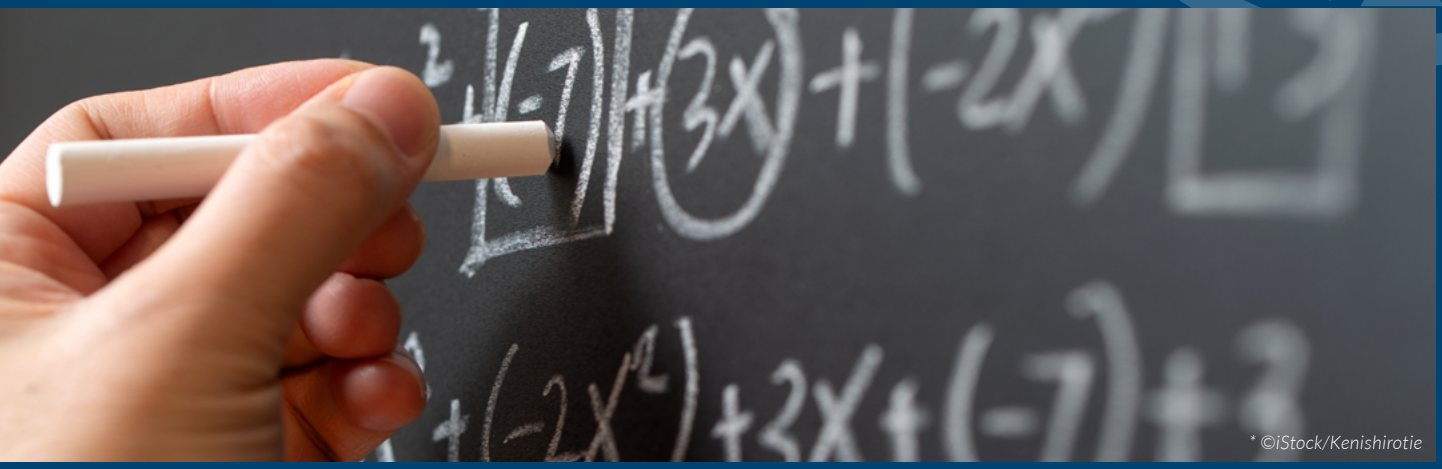
Number 30 | Special Issue

In partnership with

unesco

IEA COMPASS:
BRIEFS IN EDUCATION

GIRLS LOSING GROUND: THE WIDENING GENDER GAP IN MATHEMATICS



* ©iStock/Kenishirotie

SUMMARY

Using data from education systems[1] that took part in the TIMSS (Trends in International Mathematics and Science Study) assessments from 1995 to 2023 at fourth and eighth grade, this brief investigates how gender gaps in mathematics achievement have evolved over time. It considers gender gaps at both ends of the achievement scale, looking at high and low performing students. Our findings show that, while gender gaps in mathematics achievement have long been recognized, TIMSS 2023 reveals a notable increase in the share of education systems where boys outperform girls. This trend is especially pronounced at the end of primary schooling (fourth grade), but also evident at eighth grade (lower secondary). This brief concludes by discussing the potential implications of these findings, proposing measures to enhance mathematics achievement among girls, and identifying areas for further investigation.

IMPLICATIONS

Education systems should re-examine the effectiveness of their gender equality strategies, particularly those designed to support girls in mathematics from the early years of education.

Evidence from TIMSS and related studies indicates that observed gender gaps in mathematics achievement are shaped by differences in learning experiences, rather than by ability. These differences are commonly associated with persistent gender stereotypes, teacher expectations and classroom interactions (UNESCO, 2017; UNESCO, 2024), variations in students' mathematical self-belief and confidence (Xie et al., 2023), and differential participation in mathematical activities (Hencke et al., 2023). Such factors are reflected, at least in part, in TIMSS contextual data on student attitudes and instructional practices, offering insight into why gender gaps appear at both low and high levels of achievement.

The analyses outlined herein highlight asymmetries across grades and achievement levels. Gender gaps are already pronounced by the end of primary education, with widening disparities at both low and advanced international benchmark levels at fourth grade. These patterns persist into eighth grade, albeit with some variation. This highlights the need for early, sustained, and differentiated responses that address both emerging underachievement and the persistent underrepresentation of girls among high-performing students.

Efforts should be taken to:

- **Strengthen girls' early mathematical confidence** by integrating playful, spatial, and problem-solving activities in primary curricula to foster a positive mathematical identity.
- **Embed gender-transformative pedagogy in teacher education**, equipping teachers to identify and address gender bias and to promote equitable classroom interactions and participation in mathematics.
- **Monitor progress through systematic gender-disaggregated data**, enabling education systems to identify and respond to emerging patterns of underachievement and high performance, particularly in post-pandemic recovery contexts.
- **Foster supportive family and community environments**, that counter gender stereotypes, enhance the visibility of role models, and emphasize girls' potential in mathematics and STEM-related fields.

Authors
Matthias Eck, *Programme Specialist, Section of Education for Inclusion and Gender Equality, UNESCO*
Juliane Hencke, *Director, IEA Hamburg*
Falk Brese, *Research Analyst at Research and Analysis Unit, IEA*
Justine Sass, *Chief, Section of Education for Inclusion and Gender Equality, UNESCO*
Una McCarthy-Fakhry, *Senior Project Officer, Section of Education for Inclusion and Gender Equality, UNESCO*

[1] *The term 'education systems' is used here for the ease of reading to describe a country or a territory or a certain administrative entity within a country that is participating in TIMSS.*

In partnership with unesco

INTRODUCTION

While girls have historically lagged behind boys in mathematics achievement, they have caught up with boys in several countries in recent years (UNESCO, 2022). However, beginning in 2019, TIMSS data reveals widening gender gaps, with girls once again falling behind. This is a worrying trend, as strong mathematics skills are essential for driving economic and social development, innovation, and solutions to pressing global challenges.

Using TIMSS data, this brief addresses the following questions:

- How have gender gaps in mathematics achievement developed between 1995 and 2023 at fourth and eighth grades?
- How have these gender gaps evolved for high performing and low performing students in mathematics?

DATA

This brief draws on data from all education systems that took part in TIMSS assessments between 1995 and 2023—covering seven fourth grade cycles and eight eighth grade cycles—to examine how gender gaps in mathematics achievement have evolved over time. Analyses were restricted to education systems that participated in at least four TIMSS cycles including TIMSS 2023, to ensure that the observed gender gap trends reflect genuine changes over time rather than differences in participating education systems. This criterion results in a sample of 47 education systems for fourth grade and 38 for eighth grade. Since the participation of education systems in TIMSS has been relatively stable across cycles, it is unlikely that the reported trends are driven by shifts in the composition of education systems. Supplementary analyses focusing on education systems that participated in all or all but one TIMSS cycle confirm that the observed gender gap trends are not driven by changes in system composition over time and that the overall patterns remain unchanged.

The brief further explores trends at both the advanced international and the low international achievement benchmarks, providing more detailed insights on performance gaps for high- and low-performing students. The TIMSS international benchmarks in mathematics describe four different levels of students' mathematics achievement (advanced, high, intermediate, and low) and the mathematical skills demonstrated at each of these levels. Based on TIMSS definitions (see von Davier et al., 2024), the competencies associated with each of the benchmarks are outlined in Table 1 of the appendix.

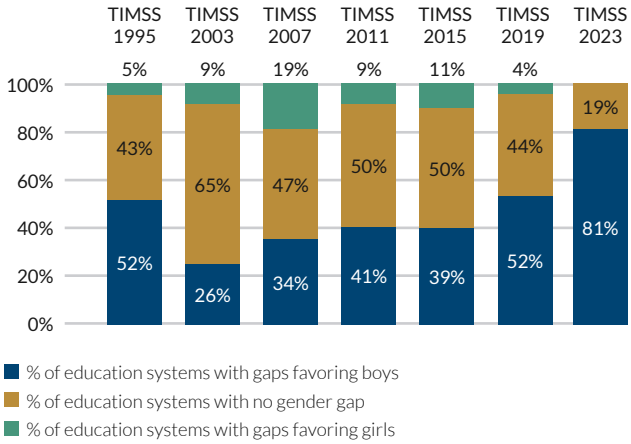
RESULTS

Gender gaps in TIMSS mathematics achievement: A growing concern

Figures 1 and 2 present the percentage of education systems that have participated in at least four TIMSS cycles (including TIMSS 2023) and that exhibit statistically significant gender gaps in mathematics achievement—either favoring boys or favoring girls—or no significant gap, at fourth and eighth grades, respectively. Gaps are identified as statistically significant differences[2] between the average girls' and the average boys' mathematics achievement in an education system.

In TIMSS 2023, there is a noticeable increase in the percentage of education systems where boys significantly outperform girls in mathematics at both fourth grade (primary) and eighth grade (lower secondary). Since the inception of TIMSS in 1995, the share of education systems favoring boys reached its highest level in 2023. Gaps are especially pronounced at fourth grade where, compared to eighth grade, the share of education systems showing higher performance among boys is substantially higher since TIMSS 2011.

*Figure 1: Percentage of education systems with gender gaps at **fourth grade***

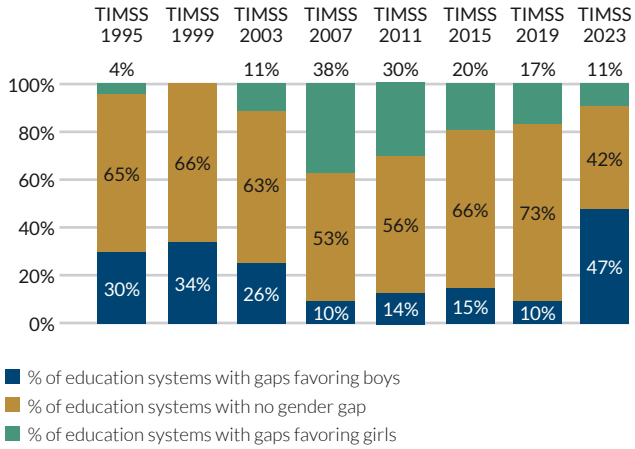


Note: Education systems were included in the graphics if they participated in four or more TIMSS cycles including TIMSS 2023. Percentages may not add up to 100 due to rounding.

[2] *A 95% confidence level was chosen for indicating differences as statistically significant.*

In earlier TIMSS cycles, a substantial proportion of education systems showed no statistically significant gender differences in mathematics achievement ranging between 43% in TIMSS 1995 and 65% in TIMSS 2003. In TIMSS 2023, however, this neutral zone has diminished to 19%, marking the smallest proportion of education systems with no gaps. In addition, in 2023, gender disparities at fourth grade now exclusively favor boys.

*Figure 2: Percentage of education systems with gender gaps at **eighth grade***



Note: Education systems were included in the graphics if they participated in four or more TIMSS cycles including TIMSS 2023. Percentages may not add up to 100 due to rounding.

At eighth grade, the picture is somewhat more mixed, with some education systems still showing gaps favoring girls, albeit declining from 38% in TIMSS 2007 to 11% in TIMSS 2023. Nevertheless, there is a similar upward trend in the number of education systems with boy-favoring gaps with almost half (47%) of education systems in the latest TIMSS cycle, indicating that the issue is not confined to primary education but persists through upper grade levels.

Additional analyses differentiating between trivial (<10 score point difference) and meaningful gender differences (≥ 10 score point differences) confirm that the reported trends are not an artefact of statistical significance alone and do not alter the substantive conclusions.

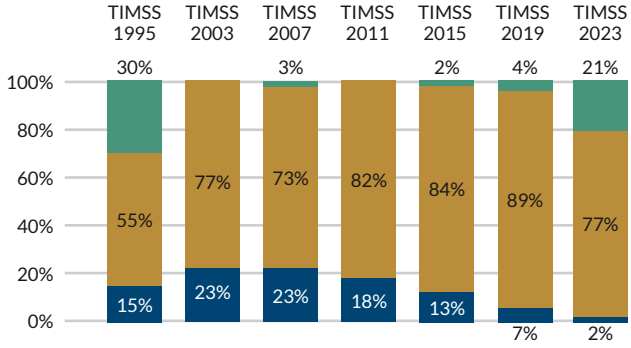
Gender gaps at the international mathematics benchmarks: A detailed look

Figures 3 through 6 analyze gender gap distributions in education systems that have participated in at least four TIMSS cycles. The analysis focuses on two specific levels of student achievement at each end of the achievement scale: students who did not reach the low international benchmark and students who reached the advanced international benchmark.

Rising female underachievement at the lowest international benchmark

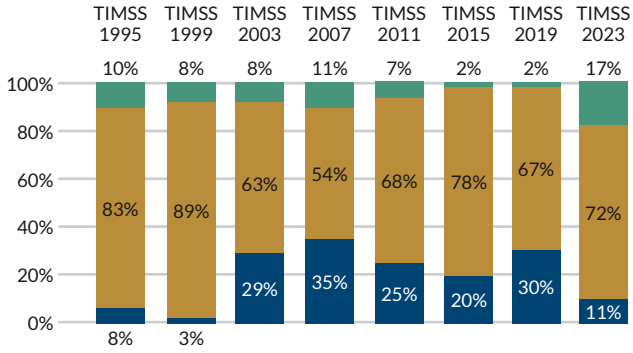
Since TIMSS 2007, the share of education systems where a significantly higher percentage of boys than girls in fourth grade did not reach the low international mathematics benchmark has steadily declined, nearly disappearing by 2023. This marks a clear shift in gender gaps at the lower end of proficiency, with the direction of disadvantage increasingly affecting girls. Across all cycles, the main pattern has been gender parity (or no differences between boys and girls). Between 2003 and 2019, very few education systems showed a higher proportion of girls failing to reach the low benchmark. However, by TIMSS 2023, this figure rose to 21% of systems—nearing the 30% level recorded in 1995. This is particularly concerning for long-term gender equity in mathematics achievement.

*Figure 3: Share of education systems with significant differences in the percentages of girls and boys not reaching the **low international mathematics benchmark** at **fourth grade***



Note: Education systems were included in the graphics if they participated in four or more TIMSS cycles including TIMSS 2023. Percentages may not add up to 100 due to rounding.

*Figure 4: Share of education systems with significant differences in the percentages of girls and boys not reaching the **low international mathematics benchmark** at **eighth grade***



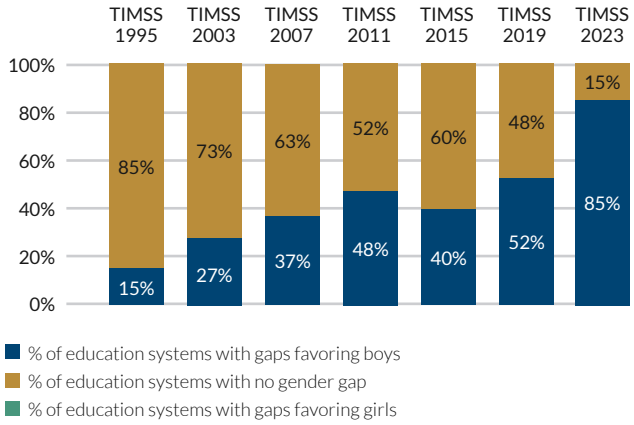
Note: Education systems were included in the graphics if they participated in four or more TIMSS cycles including TIMSS 2023. Percentages may not add up to 100 due to rounding.

The pattern at eighth grade is more complex. The proportion of education systems in which boys are significantly more likely than girls to not reach the low international benchmark increased in the middle TIMSS cycles (2003–2019) but returned to near-1995 levels in TIMSS 2023 (11% vs. 8% in 1995). Meanwhile, the share of education systems in which girls are significantly more likely than boys to not reach the low benchmark has reached its highest level in TIMSS history—17% in 2023.

Persistent male advantage and the absence of girls at the advanced international benchmark

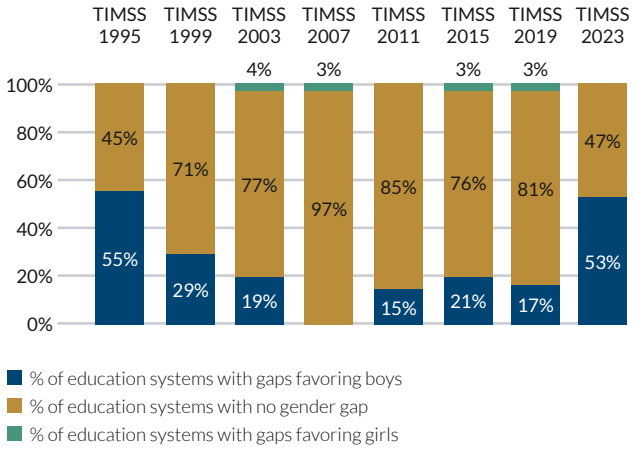
At the advanced international benchmark, the trend shows a stark and persistent picture of gender imbalance at fourth grade. Since TIMSS 1995, the share of education systems where the percentage of boys reaching this level is significantly higher than girls has steadily increased. By TIMSS 2023, a striking 85% of education systems participating in four or more cycles show a significant male advantage. Notably, no education system has shown a significant advantage for girls at this benchmark, highlighting persistent barriers for girls at the highest achievement levels at primary level.

*Figure 5: Share of education systems with significant differences in the percentages of girls and boys reaching the **advanced international mathematics benchmark** at **fourth grade***



Note: Education systems were included in the graphics if they participated in four or more TIMSS cycles including TIMSS 2023. Percentages may not add up to 100 due to rounding.

*Figure 6: Share of education systems with significant differences in the percentages of girls and boys reaching the **advanced international mathematics benchmark** at **eighth grade***



Note: Education systems were included in the graphics if they participated in four or more TIMSS cycles including TIMSS 2023. Percentages may not add up to 100 due to rounding.

At eighth grade, the pattern is slightly more mixed. In the mid-TIMSS cycles (2003–2019), the majority of education systems showed no significant gender difference in the proportion of students reaching the advanced international benchmark. However, in TIMSS 2023, more than 50% of education systems now show a significantly higher percentage of boys reaching the advanced benchmark, up from just 17% in 2019—while the remaining education systems show no significant gender differences. After several cycles between 1995 and 2019, with relatively few education systems having gaps favoring boys, the 2023 results indicate a pattern similar to 1995, effectively reversing progress observed in the intervening years. For girls, only a small number of education systems have ever shown a significant advantage in reaching the advanced benchmark at eighth grade in TIMSS. These trends underscore the broader underrepresentation of girls among high-performing mathematics students by the end of lower secondary education.

Fourth grade: Re-emerging female underachievement; persistent male advantages at the highest benchmarks

In 2023, the share of education systems where a significantly higher percentage of girls in fourth grade fail to reach the low international benchmark has re-emerged after a period between 2003 and 2019 when only a few education systems showed this pattern. At the same time, the share of education systems with a significant male disadvantage at this level has nearly disappeared (2%). This suggests a worsening situation for girls, with an increasing number performing at the very bottom.

The gender gap at the top is growing. By 2023, 85% of education systems show a significant male advantage in reaching the advanced international benchmark—a stark increase from 15% in TIMSS 1995. No education system has ever reported a significant female advantage at this level.

Eighth grade: Mixed progress with gender gaps at the extremes

In 2023, 17% of education systems have a higher proportion of girls than boys failing to reach the low international benchmark at eighth grade—the highest in TIMSS history. This shows a concerning trend, as proportionally more girls are found at the bottom end of achievement. While the proportion of education systems in which boys are more likely than girls to fall below this benchmark has decreased (11% in 2023 compared to a mid-cycle peak of 35% in TIMSS 2007), the most recent changes between 2019 and 2023 point to an emerging gender imbalance in underachievement, disadvantaging girls.

At the advanced international benchmark, the situation is similarly concerning. From a relatively balanced situation in 2007, the share of education systems with a significant male advantage has increased, reaching nearly 50% in 2023. Very few education systems have ever shown a significant female advantage at this level.

Overall, by eighth grade, girls are again increasingly represented at the bottom of the achievement scale while remaining absent at the top, mirroring the pattern observed in fourth grade.

DISCUSSION AND CONCLUSION

The findings presented in this brief reveal a concerning reversal in progress toward gender equality in mathematics achievement based on data from all TIMSS cycles. The increase in education systems where boys outperform girls, returning to levels seen nearly 30 years ago, suggests a need for renewed and more targeted policy action. Education systems may need to re-examine the effectiveness of their gender equality strategies, particularly those aimed at supporting girls in mathematics from the early years of education.

Compared with the previous cycle, the increase in the share of education systems where more girls than boys fail to reach basic proficiency in mathematics signals rising female underachievement, which is especially concerning in fourth grade. The consistent and growing male advantage at the advanced international benchmark persists, highlighting long-standing barriers to girls' higher levels of mathematics achievement. Girls being increasingly overrepresented at the lowest level of mathematics achievement while appearing less often than boys at the top points to systemic inequalities that hinder high performance and increase the risk of disengagement in mathematics among girls in early schooling.

The reversal of progress observed earlier (see for example Meinck & Brese, 2019) may partly reflect the lingering effects of the COVID-19 pandemic. Evidence from TIMSS 2023 and other international assessments indicates that longer school closures were associated with greater learning losses in mathematics, with girls often experiencing larger declines or slower recovery (Gajderowicz et al., 2024; Kuhfeld & Lewis, 2025). Although findings vary across contexts, pandemic-related disruptions may have exacerbated existing disparities and reduced learning opportunities for girls, particularly those at risk of low achievement (Bertoletti et al., 2023; Jakubowski et al., 2025; Näslund-Hadley et al., 2023; Gasteiger et al., 2023; Borgonovi & Ferrara, 2023; Contini et al., 2022; Moulin & Soncin, 2025).

In addition to academic effects, the pandemic may have amplified non-cognitive barriers. Girls consistently report lower confidence in mathematics (Hencke et al., 2022), a factor closely linked to achievement. Prolonged disruptions to in-person learning and decreased teacher or peer interaction may have further undermined girls' confidence and engagement, underscoring the need for recovery measures that rebuild self-belief and motivation alongside academic support (UNESCO, 2017; Fernandez et al., 2024).

Improving girls' participation and achievement in mathematics requires a holistic approach targeting individual, family, school, and societal factors. Fostering a growth mindset and a strong mathematical identity can boost girls' confidence and achievement (UNESCO, 2017; Fernandez et al., 2024). Family and peer support are vital. Parents play a critical role in shaping children's attitudes toward mathematics by fostering dialogue and challenging gender-based misconceptions. Conversely, when parents themselves hold such stereotypes, these beliefs can negatively impact girls' mathematics achievement (Xie & Liu, 2023). Early engagement through playful learning activities, especially those developing spatial skills, helps build foundational mathematical competence (UNESCO, 2017; Hencke et al., 2023).

At the school level, targeted interventions are essential to address emerging gender disparities. Gender differences in mathematics abilities can appear rapidly in primary school (Martinot et al., 2025). Employing qualified teachers trained in gender-responsive pedagogy can make a significant difference (UNESCO, 2017; UNESCO, 2024). Active, cooperative learning that promotes problem-solving, peer interaction, and learning from mistakes in low-pressure settings has also been shown to reduce gender gaps in mathematics (Di Tommaso et al., 2024). Real-world curricula and bias-free textbooks further support girls' engagement (UNESCO, 2017). Exposure to female role models raises aspirations and engagement by providing visible successful examples and breaking down stereotypes (Sevilla & Cuevas-Ruiz, 2022). Broader societal interventions, including gender equality policies, public awareness campaigns, and comprehensive career counseling are also crucial for challenging stereotypes and encouraging girls to pursue mathematics-related careers (UNESCO, 2024; UNESCO-UNEVOC, 2020).

The findings of this brief underscore the urgency for stakeholders to double their efforts to increase girls' mathematics achievement. Strategies should be comprehensive and multi-level, focusing not only on bringing more students to minimum proficiency in mathematics but also on nurturing high-performing girls, while addressing the factors pushing others into the lowest achievement levels. Approaches must be tailored to the specific context of each education system. An intersectional approach is essential, considering how gender interacts with factors such as ethnicity, socio-economic status, disability, and geographic location, which together shape students' opportunities and outcomes in mathematics.

Finally, this brief raises important questions for further research. How can education systems better identify and support girls at risk of underachievement, starting from the earliest grades? Which pedagogies most effectively advance girls' progression from minimum proficiency to advanced achievement levels? Is there a link between technology-facilitated education/distance education and gendered mathematics achievement? How can we prepare schools to effectively support girls during future epidemics and school disruptions?

In partnership with

unesco

FURTHER READING

Smith, A., & Evans, T. (2024). Gender gap in STEM pathways: The role of gender-segregated schooling in mathematics and science performance. *New Zealand Journal of Educational Studies*, *59*(1), 269–287. https://doi.org/10.1007/s40841-024-00320-y

UNESCO. (2017). *Cracking the code: girls' and women's education in science, technology, engineering and mathematics (STEM)*. United Nations Educational, Scientific and Cultural Organization (UNESCO). https://unesdoc.unesco.org/ark:/48223/pf0000253479

REFERENCES

Bertoletti, A., Biagi, F., Di Pietro, G., & Karpiński, Z. (2023). The effect of the COVID-19 disruption on the gender gap in students' performance: a cross-country analysis. *Large-scale Assessments Education, 11*(6). https://doi.org/10.1186/s40536-023-00154-y

Borgonovi, F., & Ferrara, A. (2023). COVID-19 and inequalities in educational achievement in Italy. *Research in Social Stratification and Mobility, 83*, 100760. https://doi.org/10.1016/j.rssm.2023.100760

Contini, D., Di Tommaso, M. L., Muratori, C., Piazzalunga, D., & Schiavon, L. (2022). Who lost the most? Mathematics Achievement during the COVID-19 Pandemic. *The B.E. Journal of Economic Analysis & Policy, 22*(2), 399–408. https://doi.org/10.1515/bejeap-2021-0447

Di Tommaso, M. L., Contini, D., De Rosa, D., Ferrara, F., Piazzalunga, D., & Robutti, O. (2024). Tackling the gender gap in mathematics with active learning methodologies. *Economics of Education Review, 100*, 102538. https://doi.org/10.1016/j.econedurev.2024.102538

Fernandez, F., Froschl, M., Lorenzetti, L., & Stimmer, M. (2024). Investigating the importance of girls' mathematical identity within United States STEM programmes: a systematic review. *International Journal of Mathematical Education in Science and Technology, 55*(3), 650–690. https://doi.org/10.1080/0020739X.2021.2022229

Gajderowicz, T., Kennedy, A., Kjeldsen C. C., Patrinos, H. A., & Strietholt, R. (2024). The Learning Crisis: Three Years After COVID-19. *Institute of Labor Economics*. http://dx.doi.org/10.2139/ssrn.5059328

Gasteiger, H., Sachse, K. A., Schumann, K., Gerve, M., Schulz, A., & Engelbert-Kocher, M. (2023). COVID-19-related school closures and mathematical performance—findings from a study with grade 3 students in Germany. *Frontiers in Education, 8*, 1213857. https://doi.org/10.3389/feduc.2023.1213857

Hencke, J., Eck, M., Sass, J., Hastedt, D., & Mejia-Rodriguez, A. (2022). *Missing out on half of the world's potential: Fewer female than male top achievers in mathematics and science want a career in these fields.* IEA Compass: Briefs in Education No. 17. IEA. https://www.iea.nl/sites/default/files/2022-04/Compass%20Brief%2017%20Missing%20out%20on%20half%20of%20the%20worlds%20potential.pdf

Hencke, J., Eck, M., Sass, J., Hastedt, D., Meinck, S., Kennedy, A., & Liu, T. (2023). *Early learning activities matter for girls' and boys' mathematics and science achievement*. IEA Compass: Briefs in Education, No. 21. IEA. https://www.iea.nl/sites/default/files/2024-02/IEA%20Compass%2021%20Early%20Learning%20Matters.pdf

Jakubowski, M., Gajderowicz, T., & Patrinos, H.A. (2025). COVID-19, school closures, and student learning outcomes. New global evidence from PISA. *npj Science of Learning*, *10*(5). https://doi.org/10.1038/s41539-025-00297-3

Kuhfeld, M., and Lewis, K. (2025). 5 years after COVID-19 hit: Test data converge on math gains, stalled reading recovery. Brookings. https://www.brookings.edu/articles/5-years-after-covid-19-hit-test-data-converge-on-math-gains-stalled-reading-recovery/

Martinot, P., Colnet, B., Breda, T., Sultan, J., Touitou, L., Huguet, P., Spelke, E., Dehaene-Lambertz, G., Bressoux, P., & Dehaene, S. (2025). Rapid emergence of a maths gender gap in first grade. *Nature*, 643, 1020–1029. https://doi.org/10.1038/s41586-025-09126-4

Meinck, S., Brese, F. (2019). Trends in gender gaps: using 20 years of evidence from TIMSS. *Large-scale Assessments in Education 7*(8). https://doi.org/10.1186/s40536-019-0076-3

Moulin, L., Soncin, M. (2025). Persistent impacts of the COVID-19 pandemic on student outcomes in Italy. *Research in Economics*, *79*(2), 101031. https://doi.org/10.1016/j.rie.2025.101031

Näslund-Hadley, E., Alonzo, H., Villanueva, N., Gideon, R., & Flowers, Y. (2023). *The Effects of the COVID-19 Pandemic on Education Outcomes in Belize*. https://doi.org/10.18235/0004836

Sevilla, A., & Cuevas-Ruiz, J.P. (2022). Reducing gender gaps in mathematics education. *CentrePiece 27*(2), 20–23. https://cep.lse.ac.uk/pubs/download/cp632.pdf

Trakulphadetkrai, N. V. (2025). *MathsThroughStories.org*. University of Reading. Retrieved September 18, 2025, from https://www.mathsthroughstories.org/

UNESCO (2017). *Cracking the code: girls' and women's education in science, technology, engineering and mathematics (STEM)*. United Nations Educational, Scientific and Cultural Organization (UNESCO). https://unesdoc.unesco.org/ark:/48223/pf0000253479

UNESCO (2022). Leave no child behind: Global report on boys' disengagement from education. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000381105

UNESCO (2024). *Changing the equation: Securing STEM futures for women*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000391384

UNESCO Global Education Monitoring Report Team (2024). Support girls and women to pursue STEM subjects and careers: Advocacy brief. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000391937

UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training (2020). *Boosting gender equality in science and technology: a challenge for TVET programmes and careers*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000374888

von Davier, M., Kennedy, A., Reynolds, K., Fishbein, B., Khorramdel, L., Aldrich, C., Bookbinder, A., Bezirhan, U., & Yin, L. (2024). *TIMSS 2023 International Results in Mathematics and Science*. Boston College, TIMSS & PIRLS International Study Center. https://doi.org/10.6017/lse.tpisc.timss.rs6460

Xie, G., & Liu, X. (2023). Gender in mathematics: How gender role perception influences mathematical capability in junior high school. *The Journal of Chinese Sociology, 10*(10). https://doi.org/10.1186/s40711-023-00188-3

APPENDIX 1

Table 1: Description of the four levels of the TIMSS international benchmarks in mathematics achievement

International Benchmark	Fourth grade	Eighth grade
Low *(400 scale score points)*	*Students demonstrate basic mathematical understanding.* They can add and subtract whole numbers with up to three digits, multiply and divide single-digit whole numbers, and solve simple word problems. They can apply basic measurement ideas and properties of common geometric shapes. Students can read data from different representations and complete simple bar graphs.	*Students have knowledge of integers, basic shapes, and visual representations.* Students can apply basic properties of whole numbers. They demonstrate some knowledge of linear relationships. They can find the lengths of sides in polygons and relate views of solids. Students can read information from graphs and complete data representations.
Intermediate *(475 scale score points)*	*Students demonstrate mathematical knowledge in simple situations and relate representations.* They can perform computations with three-digit whole numbers in a variety of situations. They can add and order simple decimals. Students can measure straight distances and describe three-dimensional shapes. They can use data from multiple sources to relate representations.	*Students can apply mathematical knowledge in a variety of situations.* They can solve problems across contexts involving whole numbers, negative numbers, fractions, decimals, and proportional relationships. They can interpret relationships given visually or in words to represent them algebraically. Students demonstrate some understanding of angle measures and in relating two-dimensional and three-dimensional shapes. They can read, interpret, and integrate across sources to represent data.
High *(550 scale score points)*	*Students relate concepts or representations in extended contexts.* They can apply knowledge of properties of whole numbers to justify a solution. They show an understanding of the number line, multiples, factors, rounding numbers, and operations with fractions and decimals. Students can resolve measurement tasks across numerous contexts. They can relate two-dimensional shapes to unfamiliar three-dimensional figures and demonstrate basic understanding of angles. Students can interpret features of data representations and represent data in a variety of graphs.	*Students can apply their conceptual understanding in a variety of relatively complex situations.* They can relate magnitudes and differences between positive and negative integers, fractions, and decimals to solve problems. Students demonstrate an understanding of linear equations and can formulate algebraic expressions to represent a problem. They demonstrate a basic understanding of relationships represented as graphs on a Cartesian plane. They can apply basic properties of shapes to solve problems involving triangles, parallel lines, rectangles, and similar figures. Students can interpret data given in a variety of graphical representations to justify conclusions and solve problems involving outcomes and probabilities in familiar contexts.
Advanced *(625 scale score points)*	*Students can select and relate information to implement appropriate operations to solve problems.* They can interpret the results of computations given in problem contexts, formulate a variety of expressions and patterns, and relate fractions and decimals. They can estimate and relate measures, apply knowledge of two- and three-dimensional shapes, identify simple properties of lines and angles, and show a basic understanding of surface area and perimeter in simple shapes. Students can interpret data and make choices about data given in numerous contexts.	*Students can extend their understanding beyond working with integers alone to solve a variety of problems in novel contexts.* They can interpret relationships among fractions or decimals, negative numbers, or proportions and ratios in multistep problems. They can formulate expressions, solve algebraic equations, and demonstrate an understanding of linear functions. Students can use their knowledge of the properties of geometric figures to find missing measures and identify related shapes. Students can integrate information across data displays to represent data and justify a conclusion. Students can implement their understanding of probabilities to relate problem conditions and likelihood.

Source: von Davier et al. (2024)

IEA COMPASS:
BRIEFS IN EDUCATION

About this brief

This special issue of *IEA Compass: Briefs in Education* has been created in partnership with UNESCO. In this special issue we aim to translate TIMSS study findings into the education field, both for policymakers as well as teachers, and other practitioners in the education sector.

Follow us:

@iea_education
IEAResearchInEducation
IEA
@ieaeducation.bsky.social
@UNESCO
UNESCO
UNESCO

Christian Christrup Kjeldsen
IEA Chair

Dirk Hastedt
IEA Executive Director

Andrea Netten
Director of IEA Amsterdam

Laura Cheeseman
Senior Communications Officer, IEA

David Rutkowski
Series Editor,
Indiana University

Accessibility Statement

IEA is committed to ensuring our publications are accessible to all users. For information about the accessibility of this publication or to request an alternative format, please visit our Accessibility Statement or contact us at secretariat@iea.nl.

Please cite this publication as:
Eck, M., Hencke, J., Brese, F., Sass, J., McCarthy-Fakhry, U. (2026, April). Girls Losing Ground: The Widening Gender Gap in Mathematics. *IEA Compass: Briefs in Education* No.30. IEA.

ISSN: 2589-7039

Copies of this publication can be obtained from:

Stichting IEA
Secretariaat Nederland
Keizersgracht 311
1016 EE Amsterdam
The Netherlands

By email: secretariat@iea.nl
Website: www.iea.nl

In partnership with

unesco

IEA

Researching education, improving learning