Measuring Up?

How Did Latin America and the Caribbean Perform on the 2009 Programme for International Student Assessment (PISA)?

PREAL
Partnership for Educational Revitalization in the Americas

Alejandro J. Ganimian
Alexandra Solano Rocha

First edition. Published in the USA.

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Acknowledgments

This document was prepared by the Partnership for Educational Revitalization in the Americas (PREAL). PREAL is a joint program of the Inter-American Dialogue in Washington, DC, and the Corporation for Development Research (CINDE) in Santiago, Chile. It seeks to improve the quality and equity of education by helping public and private sector organizations throughout the hemisphere promote informed debate on education policy, identify and disseminate best practices, and monitor progress toward improvement.

PREAL's activities are made possible by the generous support of the American people through the United States Agency for International Development (USAID), and by the Inter-American Development Bank (IDB), the GE Foundation, the International Association for the Evaluation of Educational Achievement (IEA), the World Bank, and others. However, the contents of this document are the sole responsibility of the authors and do not necessarily reflect the views of PREAL or any of its donors.

The authors gratefully acknowledge the comments provided by: Patricia Arregui, Sergio Bitar, José Octavio Bordón, Joan Caivano, Marguerite Clarke, Peter Hakim, Katherina Hruskovec, Mariellen Jewers, Michael Lisman, Michael Shifter, Elizabeth Stokely, and Gilbert Valverde. Jeffrey Puryear and Tamara Ortega Goodspeed were particularly instrumental in helping bring this publication to fruition. The contents and any errors of fact or interpretation are entirely the authors'.

The data on which this document is based are available on the website of the Organisation for Economic Co-operation and Development's (OECD) Programme for International Student Assessment at: http://www.pisa.oecd.org/. PREAL would like to extend its appreciation to the OECD for making these data publicly available.

Letter From the Co-directors

In recent years, research has shown that getting children in school and making sure they graduate is not enough to ensure that they live fulfilling lives. The quality of the education they receive—i.e., what they learn while at school—makes a considerable difference in their ability to get well-paid jobs and fully participate in society as adults.

Fortunately, the emergence of international student achievement tests over the past decade has produced a wealth of information about how much students in each country are learning and how they compare with their counterparts in other nations. As more Latin American and Caribbean countries participate in these tests, we are getting a more complete picture of student learning in the region, which we believe is a necessary first step to help schools improve.

However, as essential as they are, brief high-quality analyses of the results of international student achievement tests are often hard to come by. Media coverage tends to focus almost exclusively on overall rankings and it is usually difficult to distill a few key messages from the reports produced by testing agencies. Thus, we decided to produce a series of documents that would enable a wider audience to gain a better understanding of student learning in Latin America and the Caribbean. In 2009, we published the first document of this type, on the results of UNESCO's second regional student achievement test.

In this document, we present user-friendly tables and graphs to highlight the key messages from the 2009 Programme for International Student Assessment (PISA) for Latin America and the Caribbean. In doing so, we hope to contribute to debates among policy-makers, parents, teachers, and business leaders on how to raise student learning in the region.

Best regards,

Jeffrey Puryear & Marcela Gajardo
Co-directors, PREAL

Executive Summary

In 2009, nine Latin American and Caribbean countries participated in the Program for International Student Assessment (PISA), a global student achievement test that assesses the skills of 15-year-olds in math, reading, and science. The test has been administered by the Organisation for Economic Co-operation and Development (OECD) every three years since 2000. Sixty-five education systems participated in 2009, including Argentina, Brazil, Chile, Colombia, Mexico, Panama, Peru, Trinidad and Tobago, and Uruguay.

THE GOOD NEWS

- ✓ **Some countries in Latin America and the Caribbean improved their performance, although none reached OECD levels.** Of all participating countries, Peru and Chile improved most in reading and Mexico and Brazil in math. Brazil and Colombia improved in science.

- ✓ **Some countries reduced notably the proportion of students at the lowest levels.** Brazil and Mexico reduced the percentage of under perfomers in all three subjects. Chile and Peru did so in reading, and Chile and Colombia in science.

- ✓ **A few countries raised their proportions of top students, but by less than 1 percentage point.** Chile and Brazil increased their percentage of top performers in reading; Mexico in math. Chile's proportion of top performers in science decreased.

Executive Summary

THE BAD NEWS

- ✓ **All countries in the region ranked in the bottom third in all subjects tested.** Chile performed best in the region in reading and science but tied with others in math. Panama and Peru were the worst performers in the region in all subjects.

- ✓ **An alarming proportion of students failed to reach minimum skill levels.** Between 30 and 80% of students performed at the lowest levels, depending on the country and subject. Peru and Panama had the largest proportions of low performers in the region.

- ✓ **The proportion of top performers was below 3% in all countries in the region in all subjects.** In Colombia, Mexico, Panama, and Peru it was below 1% in all subjects.

- ✓ **Countries performed below what their income levels would predict.** While higher income countries tended to perform better than lower income countries on PISA, in general, Latin American countries underperformed even when compared to others with similar income per person.

- ✓ **Countries also performed below what their investment in education would predict.** While countries that invested more in education tended to perform better on PISA than countries that invested less, in general, Latin American countries did poorly even considering their levels of investment in education.

Executive Summary

ALSO WORTH NOTING

- ✓ **Girls in the region outperformed boys in reading, boys outperformed girls in math, and gender differences in science were mixed. Gaps varied widely by country.** Colombian boys had the largest advantages in math and science of participating countries.

- ✓ **Rural students lagged behind their urban peers, even after considering income.** This gap ranged from a grade level in reading in Uruguay to nearly three grade levels in Panama.

- ✓ **Income gaps were larger than gaps by gender and school location in all countries.** Poorest students were more than two grade levels behind their richest counterparts in reading.

An Overview of PISA 2009

What is PISA?

The Programme for International Student Achievement (PISA) is an international student achievement test that assesses what 15-year-olds know and can do in reading, math and science.

- ✓ **Who administers it?** The Organisation for Economic Co-operation and Development (OECD), a group of advanced countries.
- ✓ **How often is it conducted?** Every three years since 2000.
- ✓ **Who is tested?** A nationally representative sample of 15-year-olds enrolled in grades 7 or higher in both public and private schools.
- ✓ **How is it scored?** Performance in each subject is adjusted so that it has a mean score of 500 and a standard deviation of 100. It is also grouped into six levels, from 1 (lowest) to 6 (highest).
- ✓ **Is it comparable over time?** Results for reading are comparable since 2000, results for math are only comparable since 2003 and results for science are only comparable since 2006.

Who Participated in PISA 2009?

Sixty-five education systems participated in 2009, including nine from Latin America and the Caribbean (LAC). Nine other systems applied the test in 2010, including two more from the region.

- ✓ **What education systems participated?** PISA 2009 included education systems from Africa, the Americas, Asia, Oceania, the Middle East, and Europe. Participants include countries as well as cities (e.g., Shanghai in China) and autonomous regions (e.g., Dubai in the United Arab Emirates).

- ✓ **Which LAC countries had participated before?** Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Uruguay had participated before.

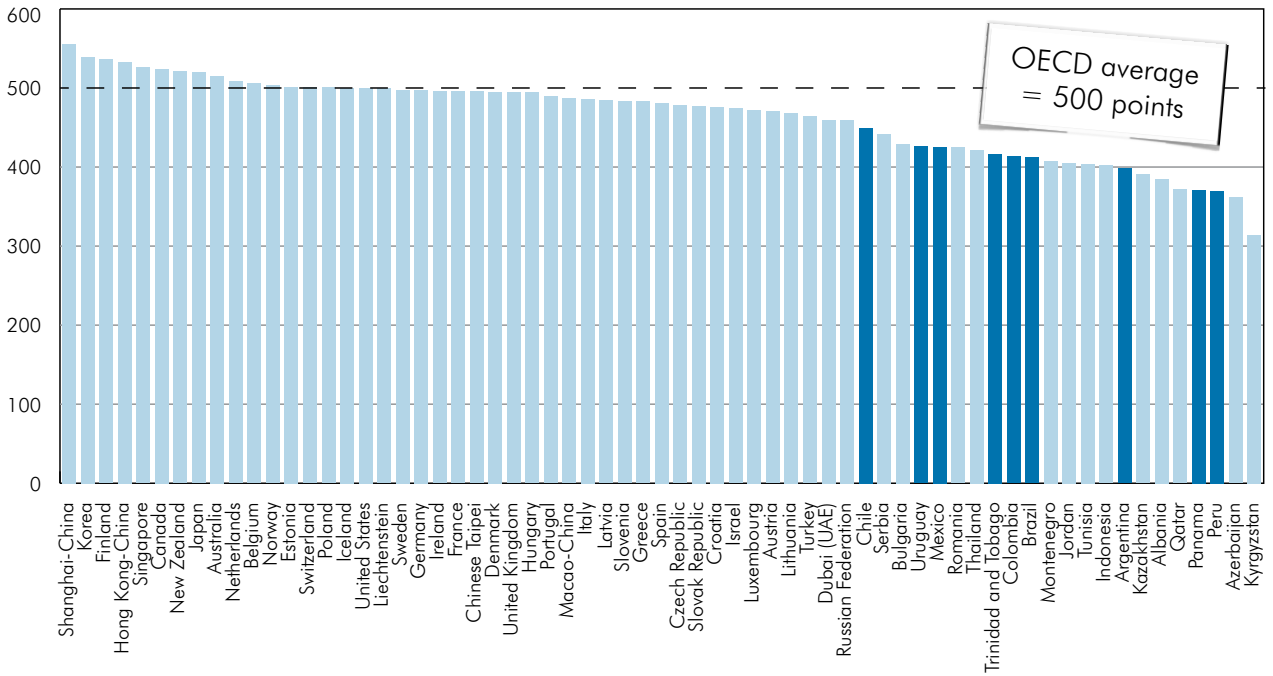
- ✓ **Which LAC countries participated for the first time?** Panama and Trinidad and Tobago participated for the first time in 2009.

- ✓ **Have other LAC education systems participated in PISA 2009?** Costa Rica and the State of Miranda in Venezuela administered the test in 2010. Their results are expected to become available in December 2011.

How Do Latin American and Caribbean Countries Rank?

Latin American and Caribbean countries ranked in the bottom third in all three subjects.

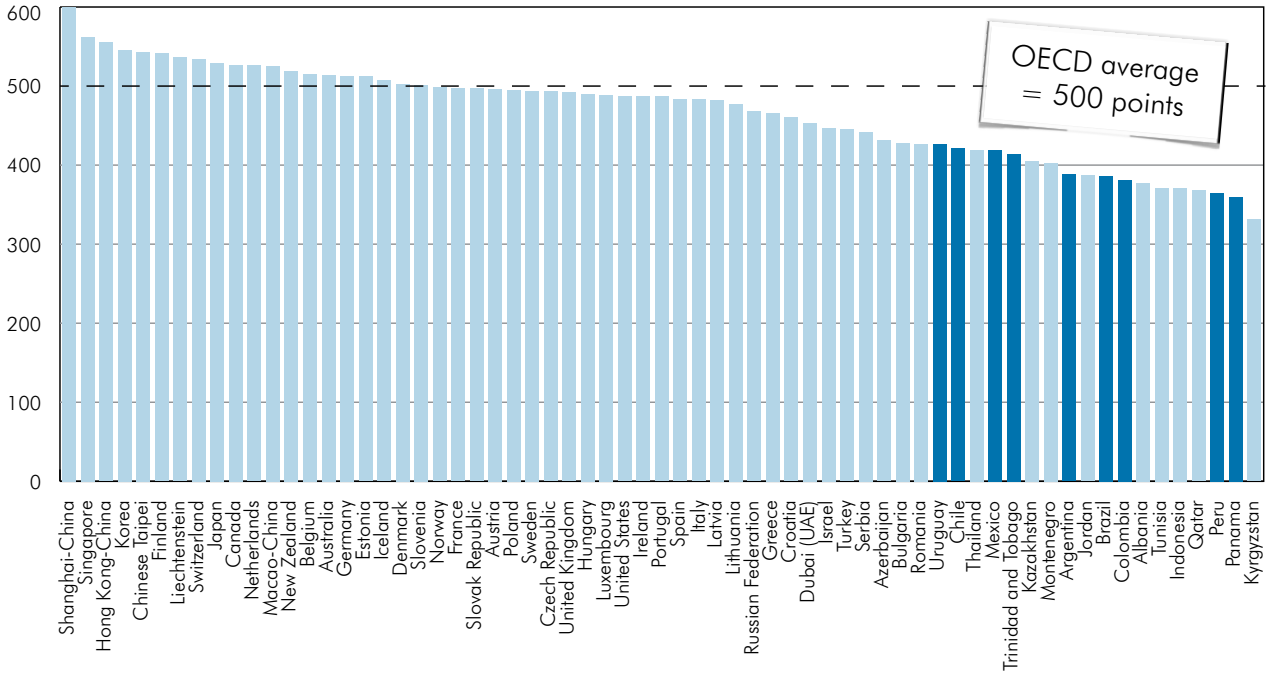
Graph 1. Mean scores on PISA reading test, 2009



Source: OECD (2010). PISA 2009, Vol. I, Table I.A. Notes: (1) Not all differences between mean scores are statistically significant. (2) OECD average was set in PISA 2000 and includes all member countries in that year.

Chile was the top performer in the region in reading and science, but tied with others in math.

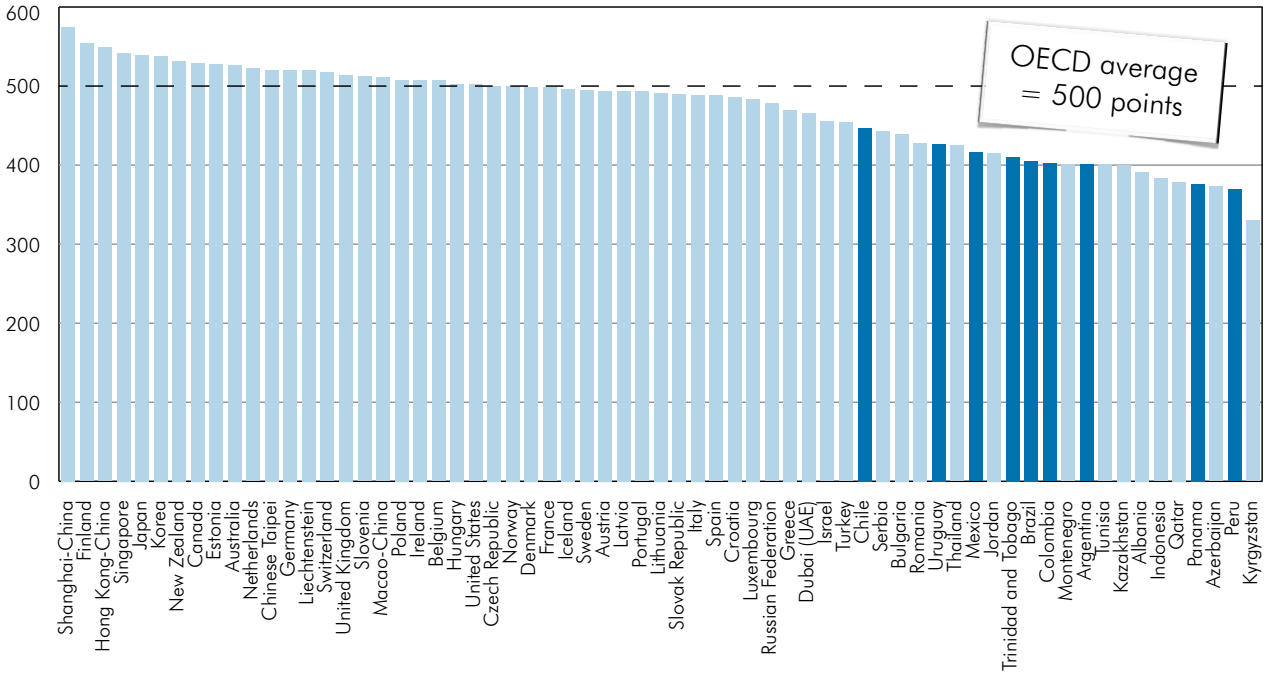
Graph 2. Mean scores on PISA math test, 2009



Source: OECD (2010). PISA 2009, Vol. I, Table I.A. Notes: (1) Not all differences between mean scores are statistically significant. (2) OECD average was set in PISA 2003 and includes all member countries in that year. (3) Score differences between Uruguay, Chile, and Mexico in math are not statistically significant.

Panama and Peru were the worst performers in the region in all subjects.

Graph 3. Mean scores on PISA science test, 2009

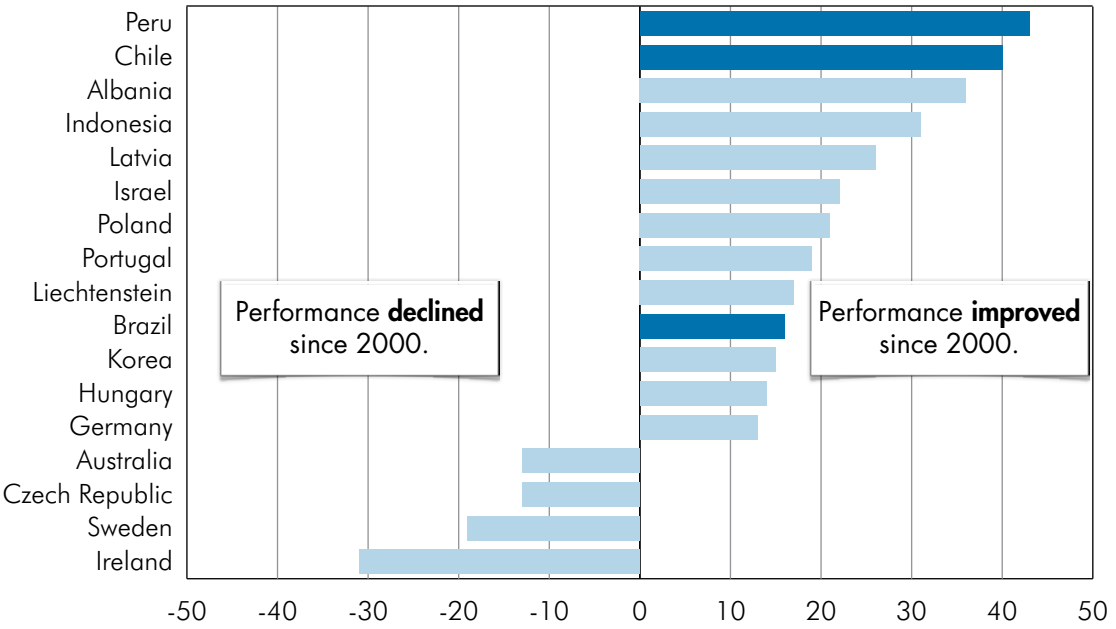


Source: OECD (2010). PISA 2009, Vol. I, Table I.A. Notes: (1) Not all differences between mean scores are statistically significant. (2) OECD average was set in PISA 2006 and includes all member countries in that year.

How Has Student Achievement Changed Over Time?

Peru and Chile improved more than any other participating country in reading. Brazil also improved.

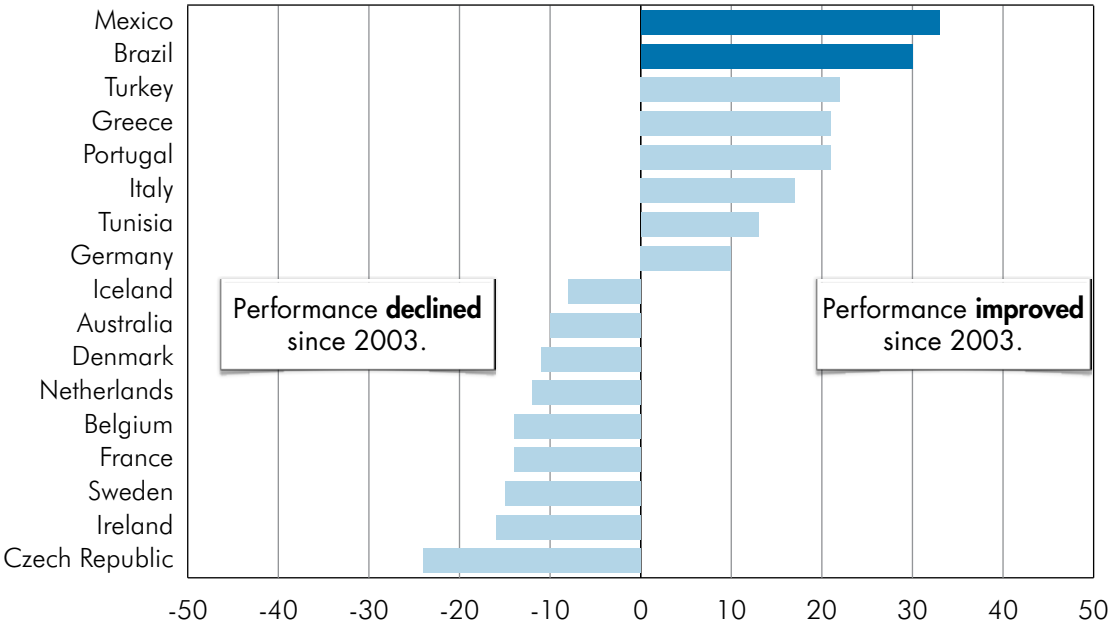
Graph 4. Changes in mean scores on PISA reading test, 2000-2009



Source: OECD (2010). PISA 2009, Vol. V, Table V.2.1. Notes: (1) This graph shows all countries that participated in PISA 2000 and 2009 and whose difference in their own performance was statistically significant between those two years. (2) Improvement data should be interpreted with caution, as changes in scores in the lower and upper tail of the tests might not be as precisely estimated as those closer to the mean. (3) Changes in mean scores are measured in points in this section.

Mexico and Brazil improved more than any other participating country in math.

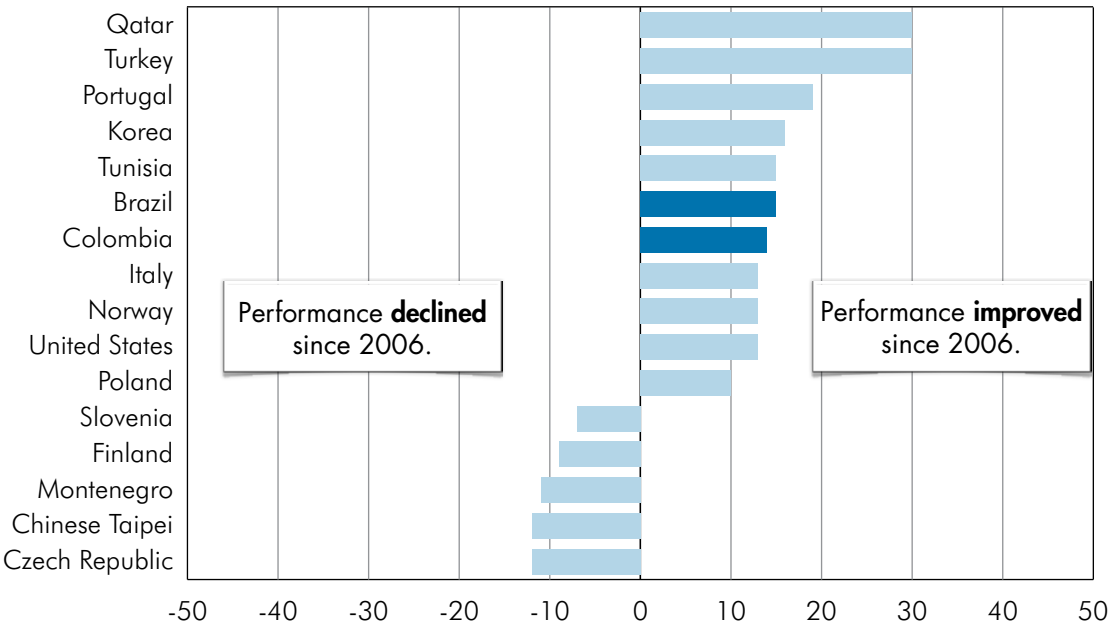
Graph 5. Changes in mean scores on PISA math test, 2003-2009



Source: OECD (2010). PISA 2009, Vol. V, Table V.3.1. Notes: (1) Math scores are only comparable since 2003. (2) This graph shows all countries that participated in PISA 2003 and 2009 and whose difference in their own performance was statistically significant between those two years. (3) Improvement data should be interpreted with caution, as changes in scores in the lower and upper tail of the tests might not be as precisely estimated as those closer to the mean.

Brazil and Colombia were the only countries in the region that improved in science.

Graph 6. Changes in mean scores on PISA science test, 2006-2009

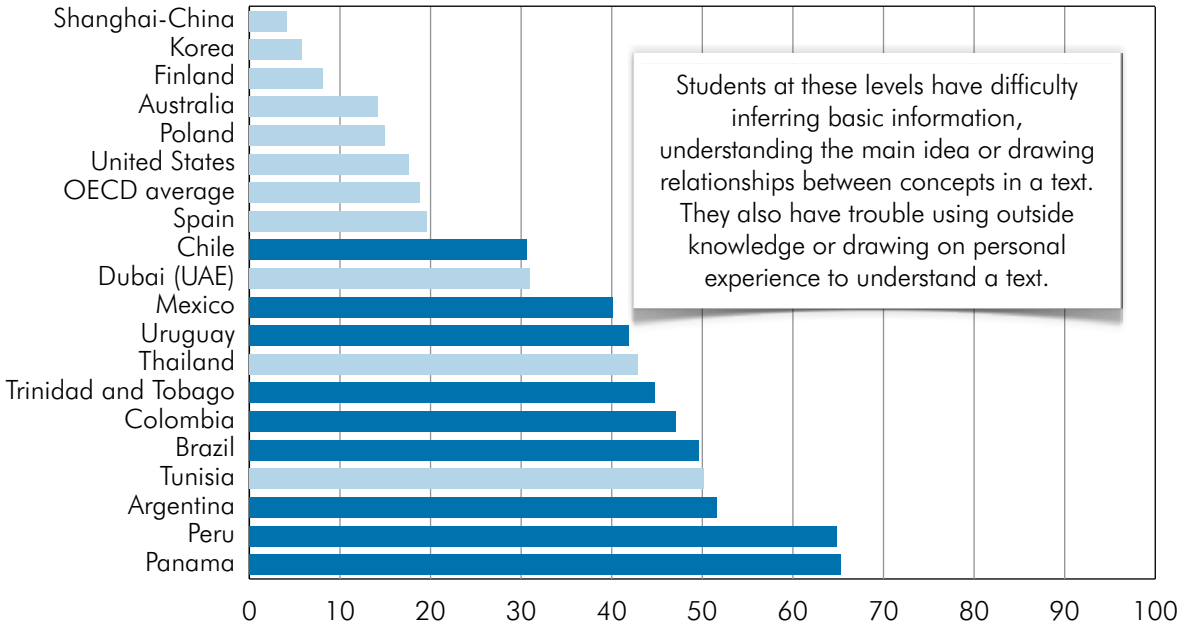


Source: OECD (2010). PISA 2009, Vol. V, Table V.3.4. Notes: (1) Science scores are only comparable since 2006. (2) This graph shows all countries that participated in PISA 2006 and 2009 and whose difference in their own performance was statistically significant between those two years. (3) Improvement data should be interpreted with caution, as changes in scores in the lower and upper tail of the tests might not be as precisely estimated as those closer to the mean.

How Many Students Underperform?

In Latin American and Caribbean countries, 30-80% of students perform at the lowest levels in all subjects.

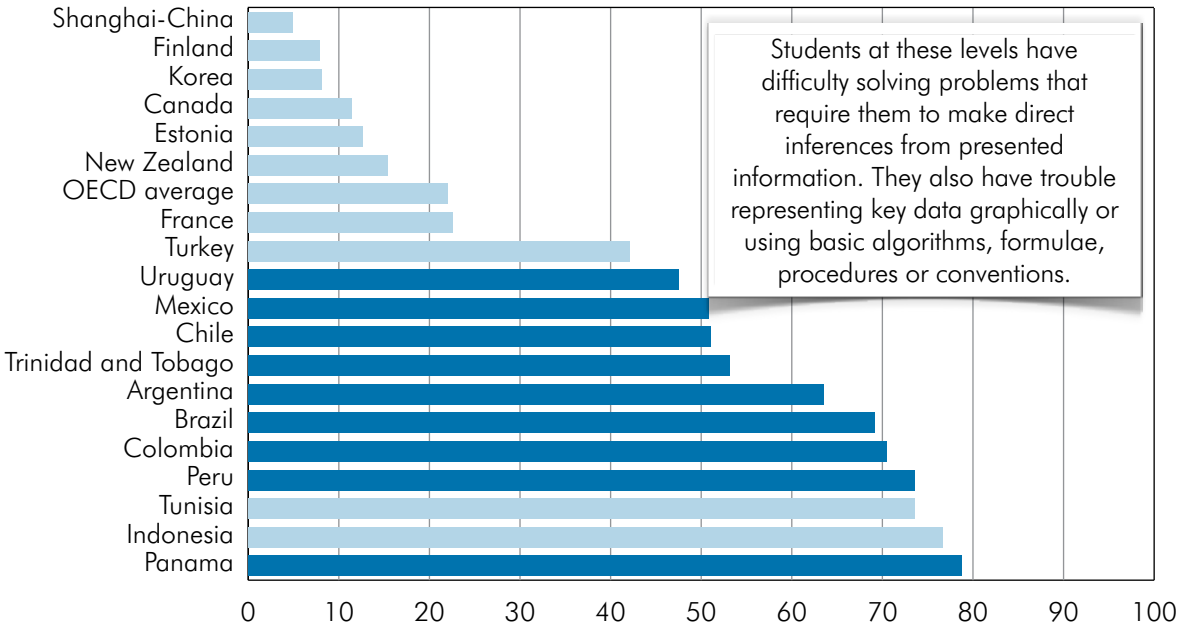
Graph 7. Percentage of students at the lowest performance levels on PISA reading test, 2009



Source: OECD (2010). PISA 2009, Vol. I, Table I.2.1. Level description adapted from OECD (2010), Vol. I, Figure I.2.12. Notes: (1) Lowest levels include Level 1 and below. (2) This graph includes the top three performers in this indicator, Latin American and Caribbean countries, one country per region (Africa, Asia, Oceania, North America, Eastern Europe, Middle East, Western Europe), and the OECD average. (3) OECD average includes all 34 member countries.

The shares of low performers in math are particularly large in the region—above 50% in nearly all countries, except for Uruguay.

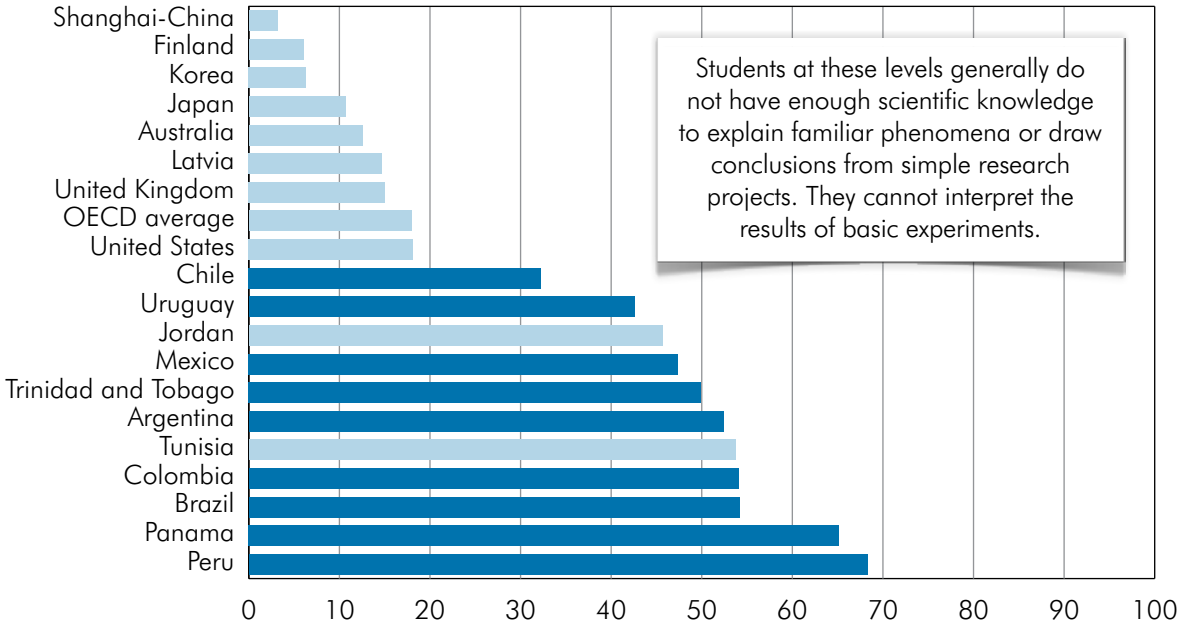
Graph 8. Percentage of students at the lowest performance levels on PISA math test, 2009



Source: OECD (2010). PISA 2009, Vol. I, Table I.3.1. Level description adapted from OECD (2010), Vol. I, Figure I.3.8. Notes: (1) Lowest levels include Level 1 and below. (2) This graph includes the top three performers in this indicator, Latin American and Caribbean countries, one country per region (Africa, Asia, Oceania, North America, Eastern Europe, Middle East, Western Europe), and the OECD average. (3) OECD average includes all 34 member countries.

Panama and Peru have the highest shares of under-performing students in the region in all subjects.

Graph 9. Percentage of students at the lowest performance levels on PISA science test, 2009

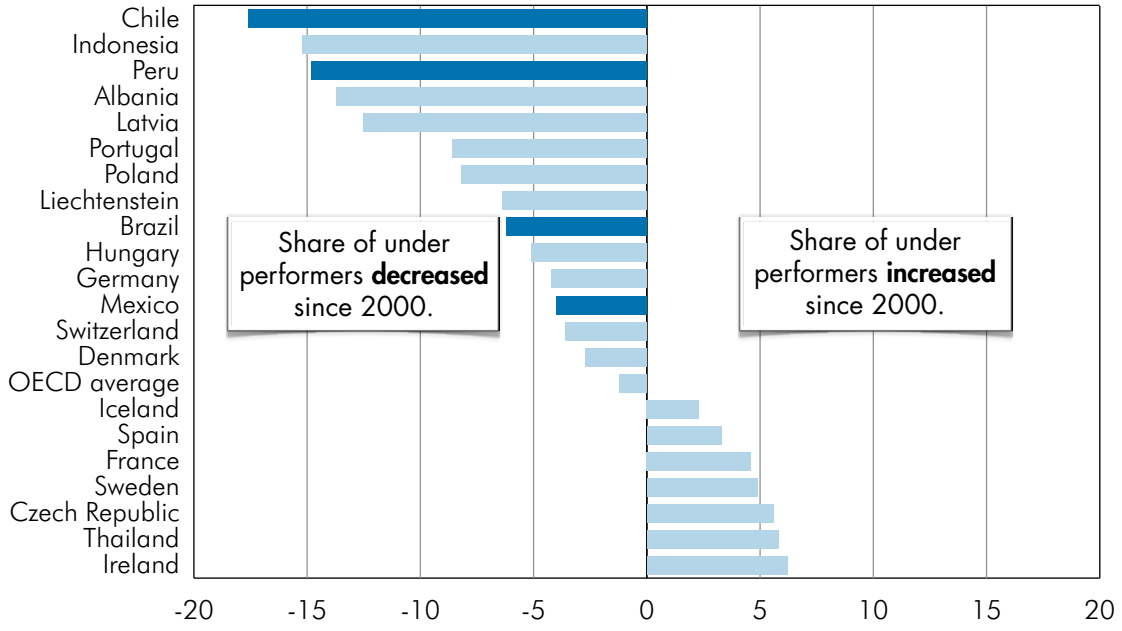


Source: OECD (2010). PISA 2009, Vol. I, Table I.3.4. Level description adapted from OECD (2010), Vol. I, Figure I.3.19. Notes: (1) Lowest levels include Level 1 and below. (2) This graph includes the top three performers in this indicator, Latin American and Caribbean countries, one country per region (Africa, Asia, Oceania, North America, Eastern Europe, Middle East, Western Europe), and the OECD average. (3) OECD average includes all 34 member countries.

How Has the Share of Under-performing Students Changed Over Time?

Chile and Peru achieved two of the largest reductions in under performers in reading among participating countries.

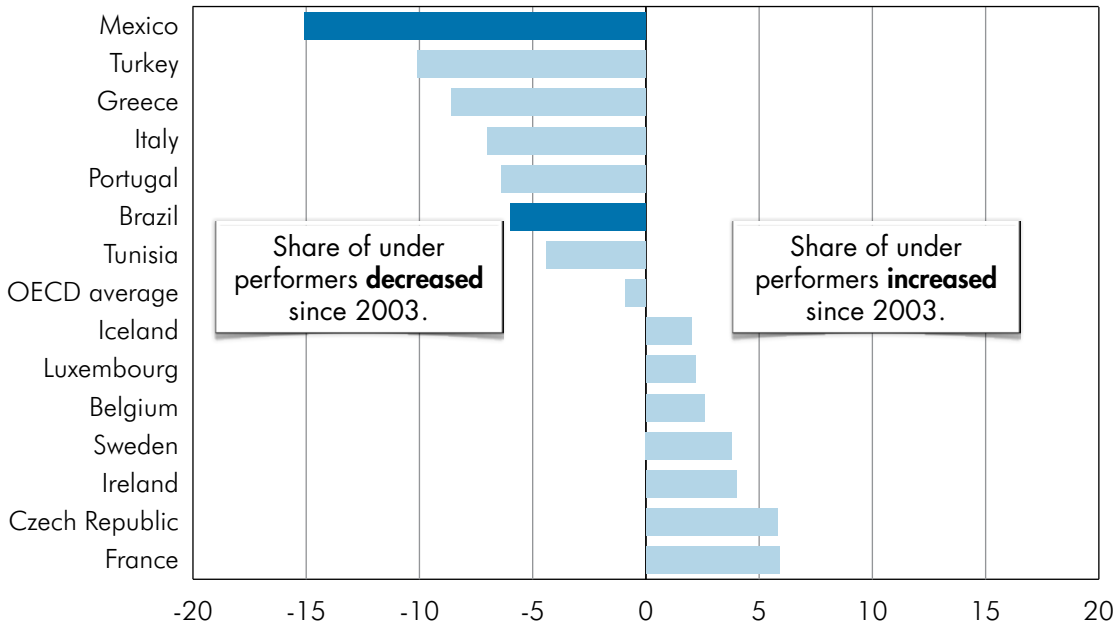
Graph 10. Changes in the percentage points of students at the lowest performance levels on PISA reading test, 2000-2009



Source: OECD (2010). PISA 2009, Vol. V, Table V.2.2. Notes: (1) Lowest levels include Level 1 and below. (2) This graph shows all countries that participated in PISA 2000 and 2009 and whose change in the share of under performers in reading was statistically significant between these two years. (3) OECD average includes all member countries with comparable data. (4) See caution on interpreting improvement data in previous sections.

In math, Mexico reduced its share of under performers more than any other participating country.

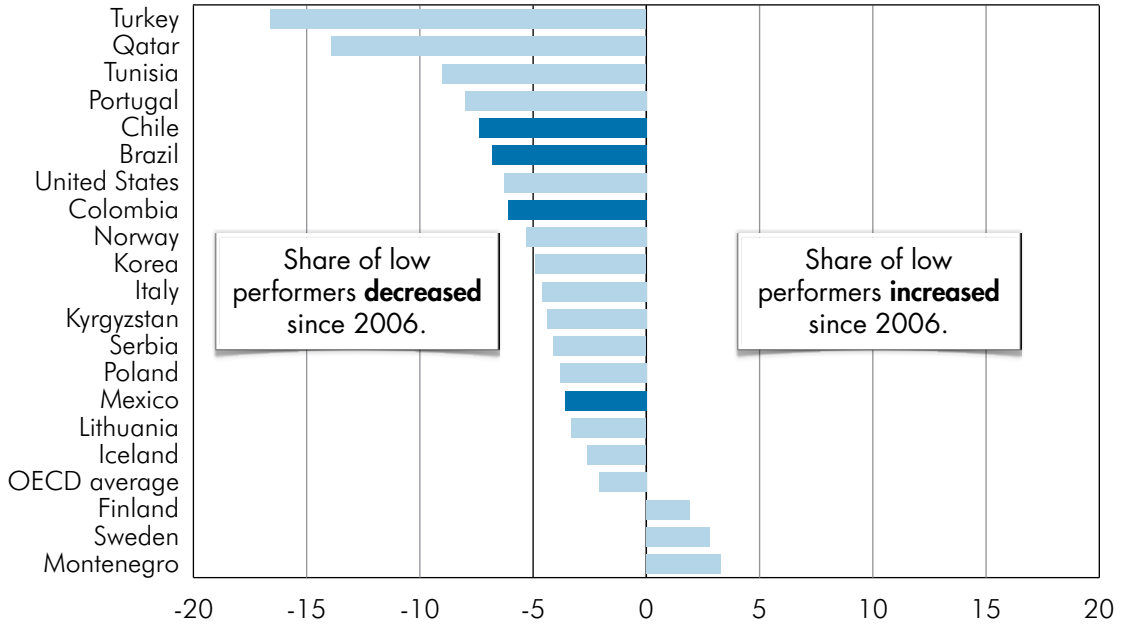
Graph 11. Changes in the percentage points of students at the lowest performance levels on PISA math test, 2003-2009



Source: OECD (2010). PISA 2009, Vol. V, Table V.3.2. Notes: (1) Lowest levels include Level 1 and below. (2) This graph shows all countries that participated in PISA 2003 and 2009 and whose change in the share of under performers in math was statistically significant between these two years. (3) OECD average includes all member countries with comparable data. (4) See caution on interpreting improvement data in previous sections.

Brazil and Mexico reduced the shares of under performers in all three subjects.

Graph 12. Changes in the percentage points of students at the lowest performance levels on PISA science test, 2006-2009

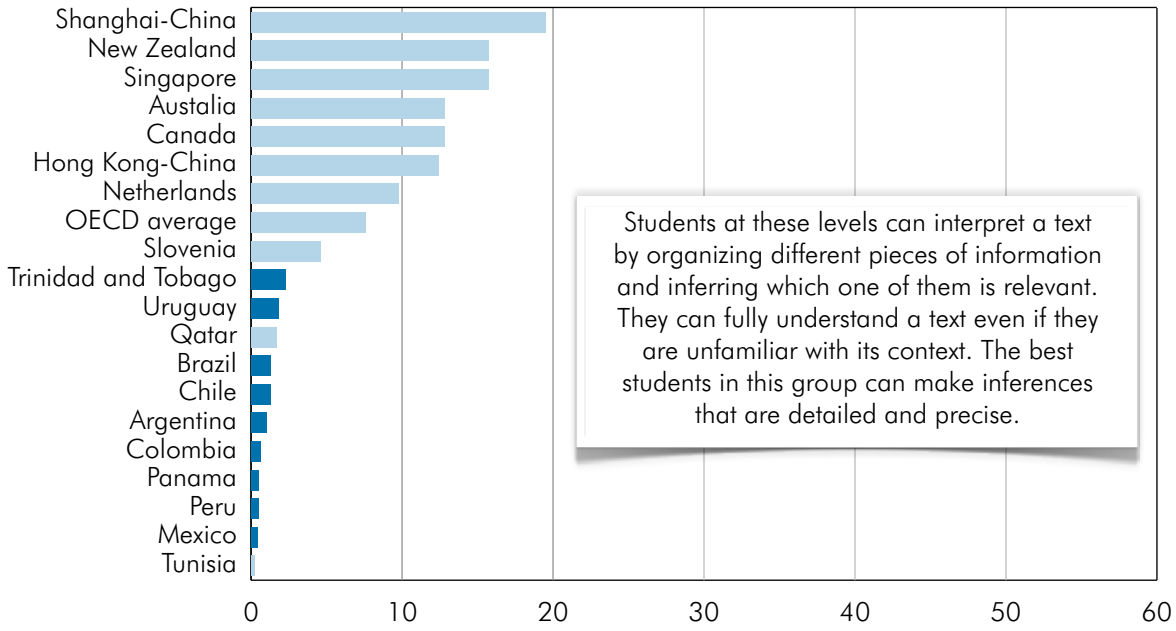


Source: OECD (2010). PISA 2009, Vol. V, Table V.3.5. Notes: (1) Lowest levels include Level 1 and below. (2) This graph shows all countries that participated in PISA 2006 and 2009 and whose change in the share of under performers in science was statistically significant between these two years. (3) OECD average includes all member countries with comparable data. (4) See caution on interpreting improvement data in previous sections.

How Many Students Excel?

The share of top performers is below 3% in all Latin American and Caribbean countries in all subjects.

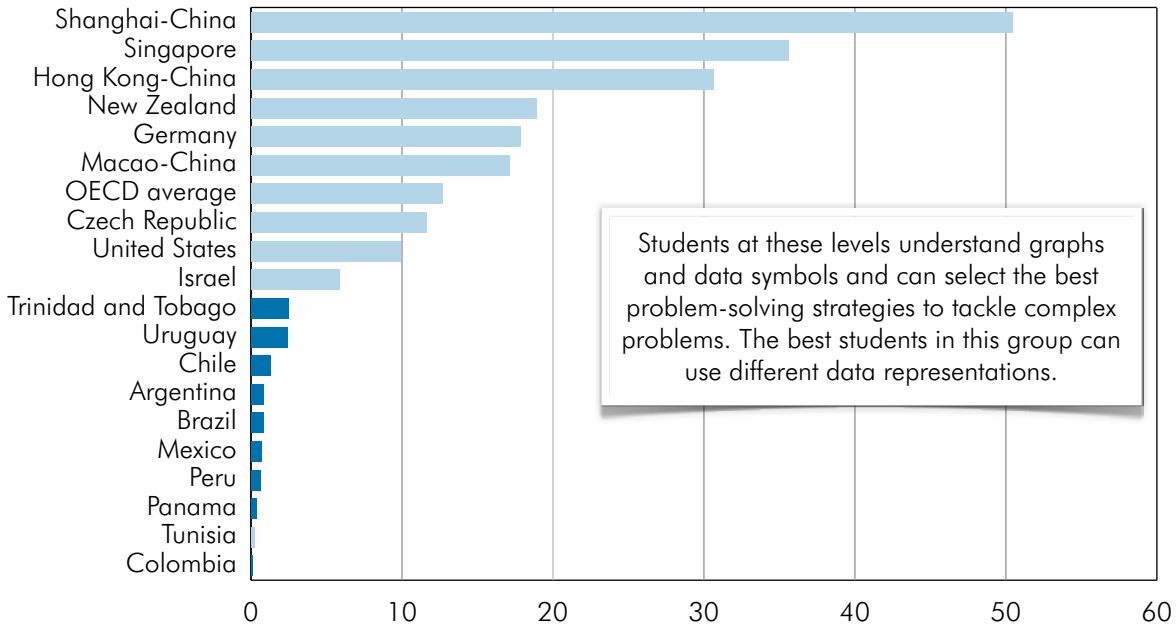
Graph 13. Percentage of students at the highest performance levels on PISA reading test, 2009



Source: OECD (2010). PISA 2009, Vol. I, Table I.2.1. Level description adapted from OECD (2010), Vol. I, Figure I.2.12. Notes: (1) Highest levels include Levels 5 and 6. (2) This graph includes the top three performers in this indicator, Latin American and Caribbean countries, one country per region (Africa, Asia, Oceania, North America, Eastern Europe, Middle East, Western Europe), and the OECD average. (3) OECD average includes all 34 member countries.

Trinidad and Tobago and Uruguay had the highest shares of top performers in the region in all subjects.

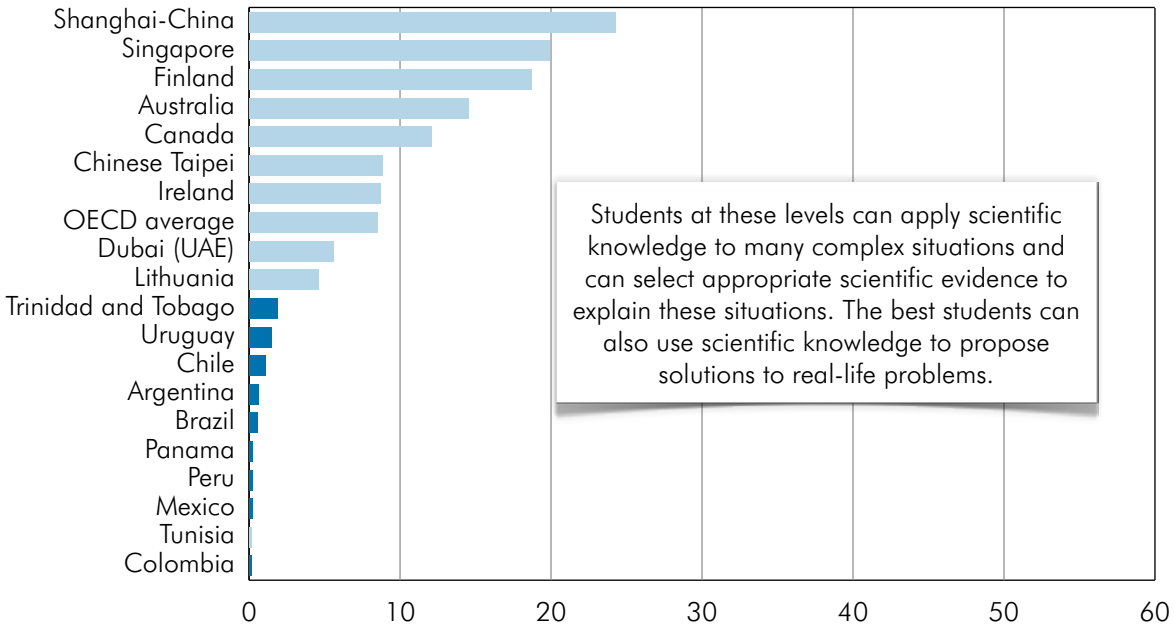
Graph 14. Percentage of students at the highest performance levels on PISA math test, 2009



Source: OECD (2010). PISA 2009, Vol. I, Table I.3.1. Level description adapted from OECD (2010), Vol. I, Figure I.3.8. Notes: (1) Highest levels include Levels 5 and 6. (2) This graph includes the top three performers in this indicator, Latin American and Caribbean countries, one country per region (Africa, Asia, Oceania, North America, Eastern Europe, Middle East, Western Europe), and the OECD average. (3) OECD average includes all 34 member countries.

In Colombia, Mexico, Peru, and Panama, the share of top performers is below 1% in all subjects.

Graph 15. Percentage of students at the highest performance levels on PISA science test, 2009

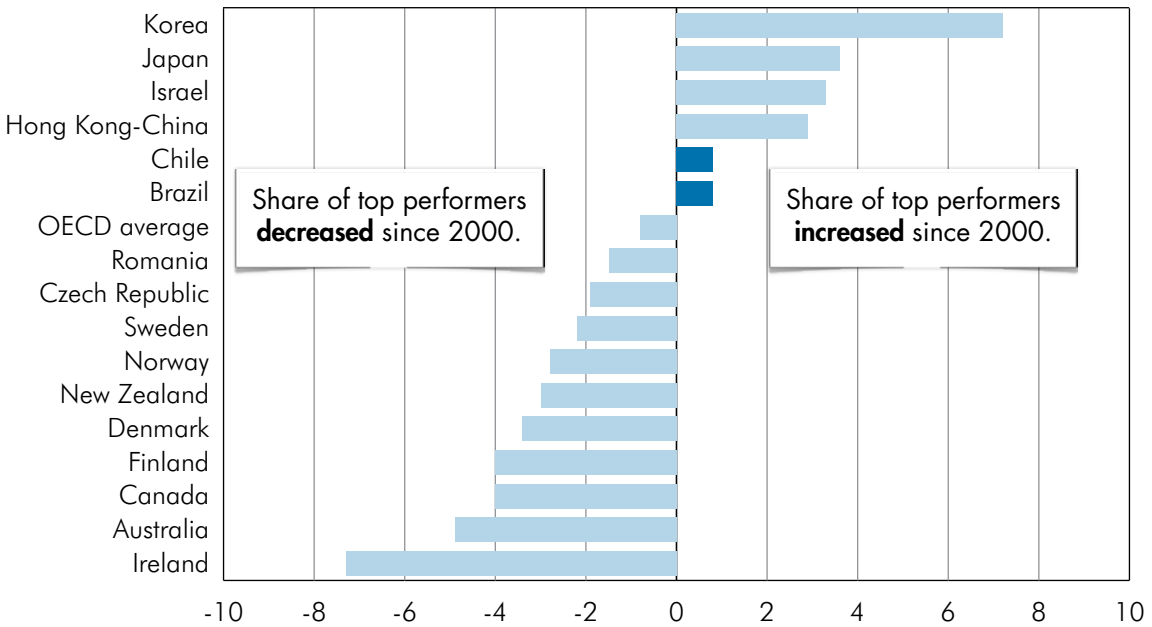


Source: OECD (2010). PISA 2009, Vol. I, Table I.3.1. Level description adapted from OECD (2010), Vol. I, Figure I.3.19. Notes: (1) Highest levels include Levels 5 and 6. (2) This graph includes the top three performers in this indicator, Latin American and Caribbean countries, one country per region (Africa, Asia, Oceania, North America, Eastern Europe, Middle East, Western Europe), and the OECD average. (3) OECD average includes all 34 member countries.

How Has the Share of Top-performing Students Changed Over Time?

The shares of top performers have changed very little in the region in all three subjects.

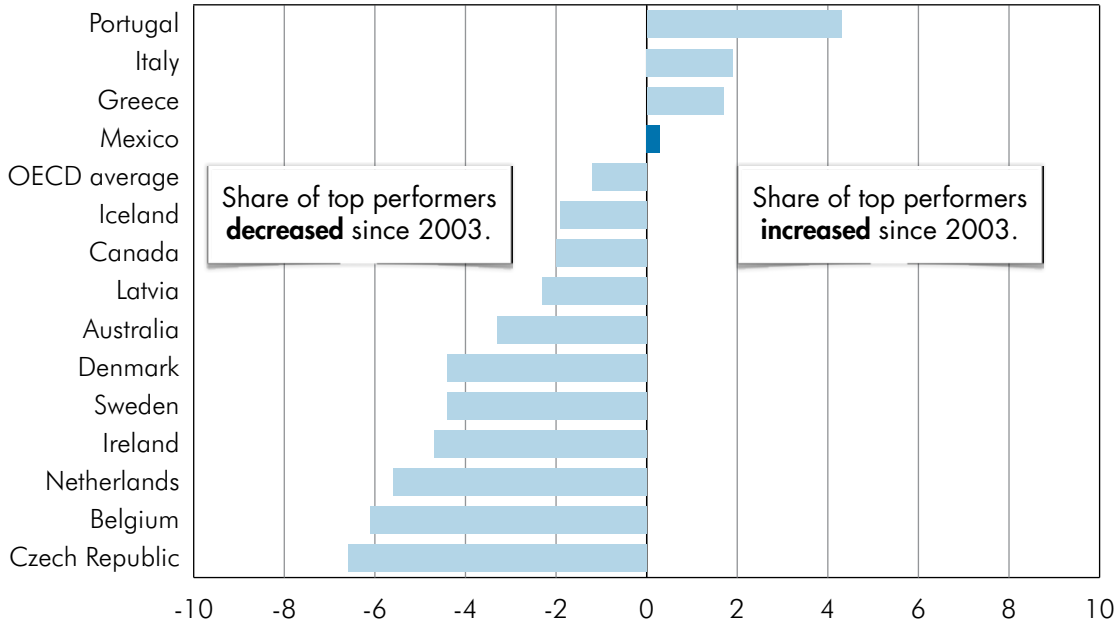
Graph 16. Changes in the percentage of students at the highest performance levels on PISA reading test, 2000-2009



Source: OECD (2010). PISA 2009, Vol. V, Table V.2.2. Notes: (1) Highest levels include Levels 5 and 6. (2) This graph shows all countries that participated in PISA 2000 and 2009 and whose change in the share of top performers in reading was statistically significant between these two years. (3) OECD average includes all member countries with comparable data. (4) See caution on interpreting improvement data in previous sections.

Brazil and Chile raised their shares of top performers in reading and Mexico in math. Yet, all increases were below one percentage point.

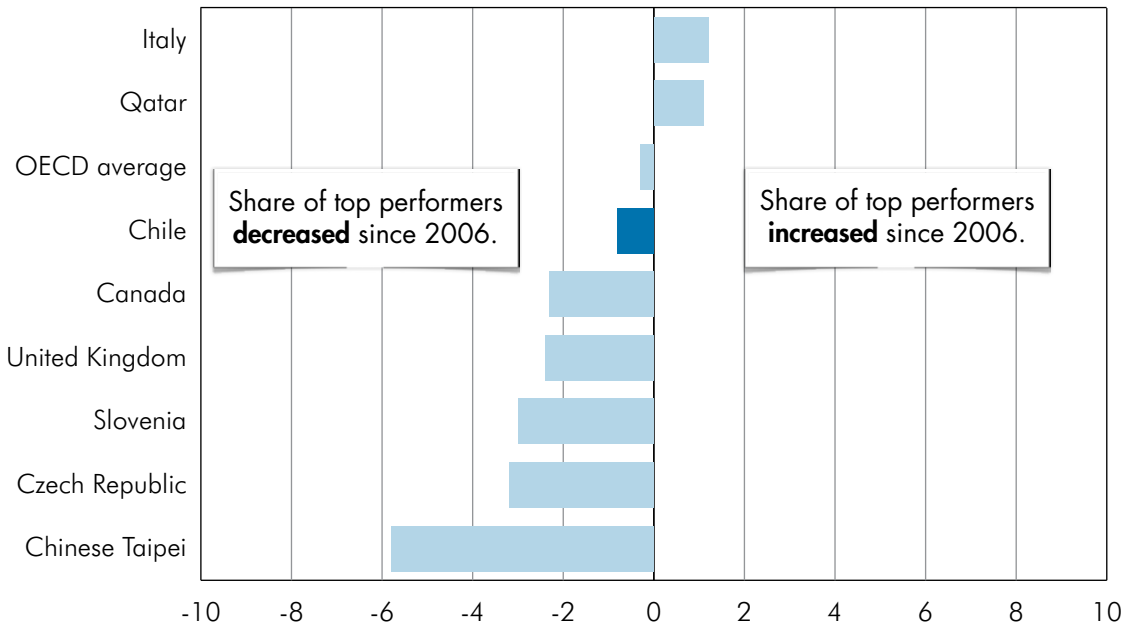
Graph 17. Changes in the percentage of students at the highest performance levels on PISA math test, 2003-2009



Source: OECD (2010). PISA 2009, Vol. V, Table V.3.2. Notes: (1) Highest levels include Levels 5 and 6. (2) This graph shows all countries that participated in PISA 2003 and 2009 and whose change in the share of top performers in math was statistically significant between these two years. (3) OECD average includes all member countries with comparable data. (4) See caution on interpreting improvement data in previous sections.

Chile's share of top performers in science shrank slightly.

Graph 18. Changes in the percentage of students at the highest performance levels on PISA science test, 2006-2009

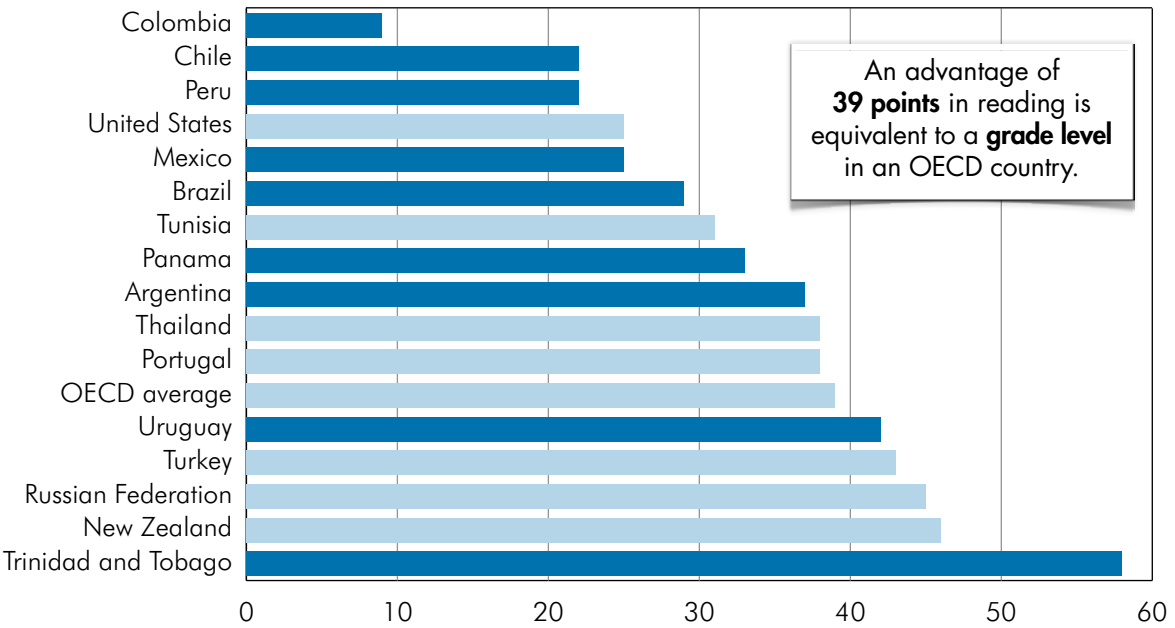


Source: OECD (2010). PISA 2009, Vol. V, Table V.3.5. Notes: (1) Highest levels include Levels 5 and 6. (2) This graph shows all countries that participated in PISA 2006 and 2009 and whose change in the share of top performers in science was statistically significant between these two years. (3) OECD average includes all member countries with comparable data. (4) See caution on interpreting improvement data in previous sections.

How Do Boys and Girls Perform?

Girls did better than boys in reading in all participating countries. Yet, gaps varied widely across countries in the region.

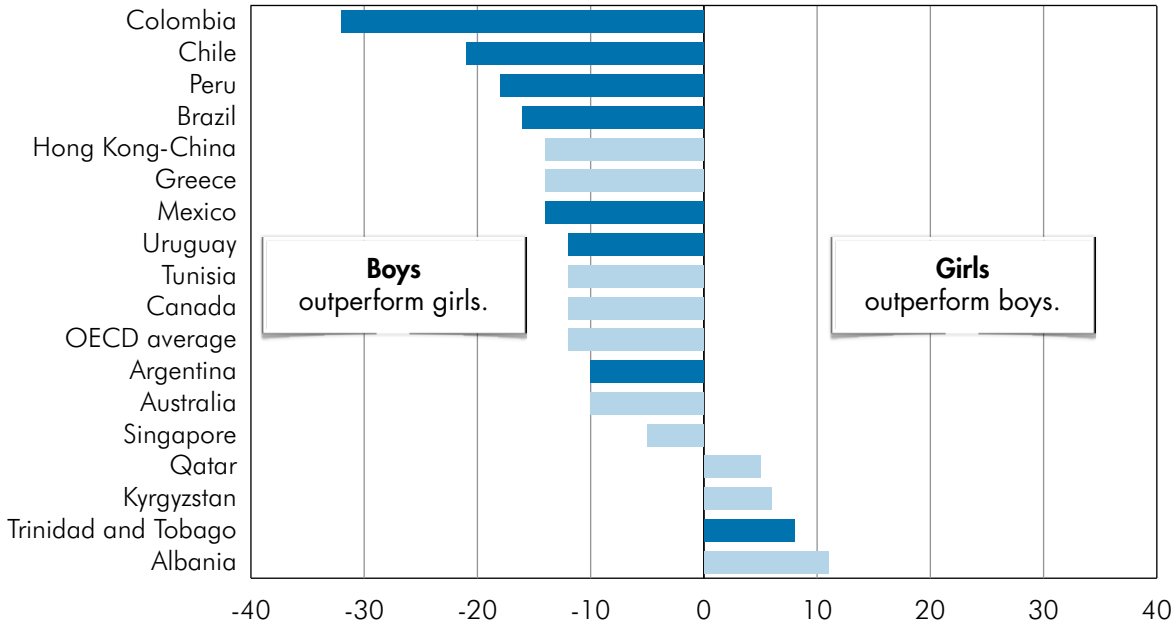
Graph 19. Girls' advantage over boys in mean scores on PISA reading test, 2009



Source: OECD (2010). PISA 2009, Vol. I, Table I.2.3. Notes: (1) Of the 65 countries, all had statistically significant gender gaps in reading. Of these, this graph only includes the top three performers in this indicator (i.e., countries with the smallest gaps), Latin American countries and one per region (Africa, Asia, Oceania, Eastern Europe, Middle East, North America, Western Europe), and the OECD average. (2) OECD average includes all 34 member countries.

Boys in the region generally did better than girls in math. These gaps also varied considerably.

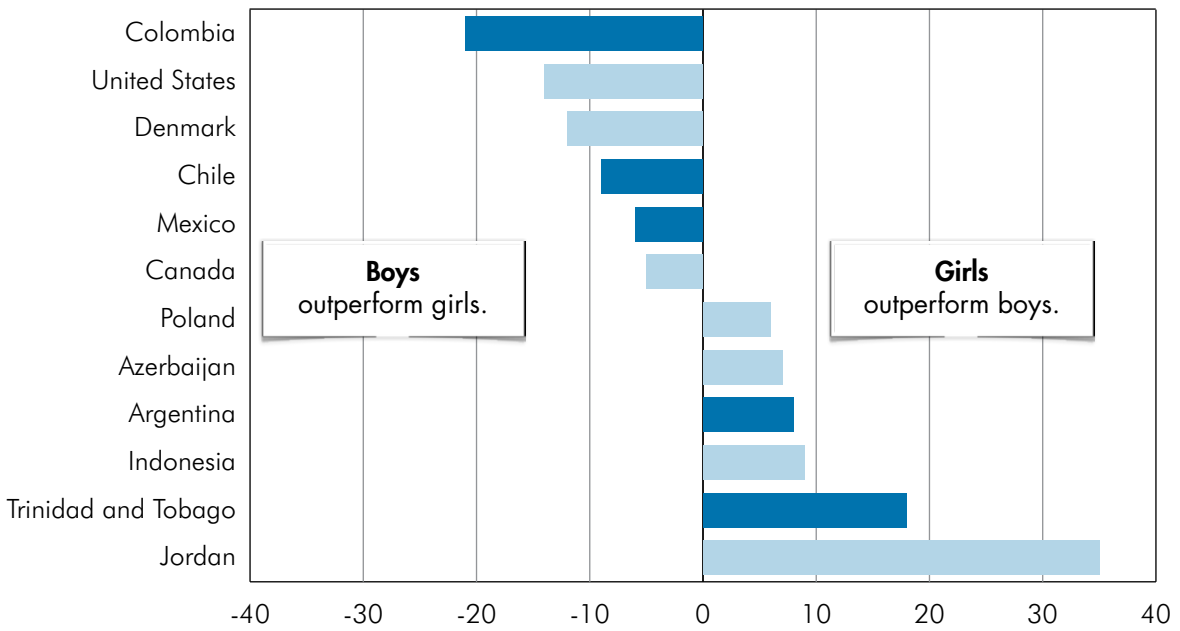
Graph 20. Difference in mean scores between girls and boys on PISA math test, 2009



Source: OECD (2010). PISA 2009, Vol. I, Table I.3.3. Notes: (1) Of the 65 countries, 42 had statistically significant gender gaps in math. Of these 42, this graph only includes the top three performers in this indicator (i.e., countries with the smallest gaps), Latin American countries and one per region (Africa, Asia, Oceania, Eastern Europe, Middle East, North America, Western Europe), and the OECD average. (2) OECD average includes all 34 member countries.

Gender gaps in science are mixed. Boys in Colombia have the largest advantages in science and math among participating countries.

Graph 21. Difference in mean scores between girls and boys on PISA science test, 2009

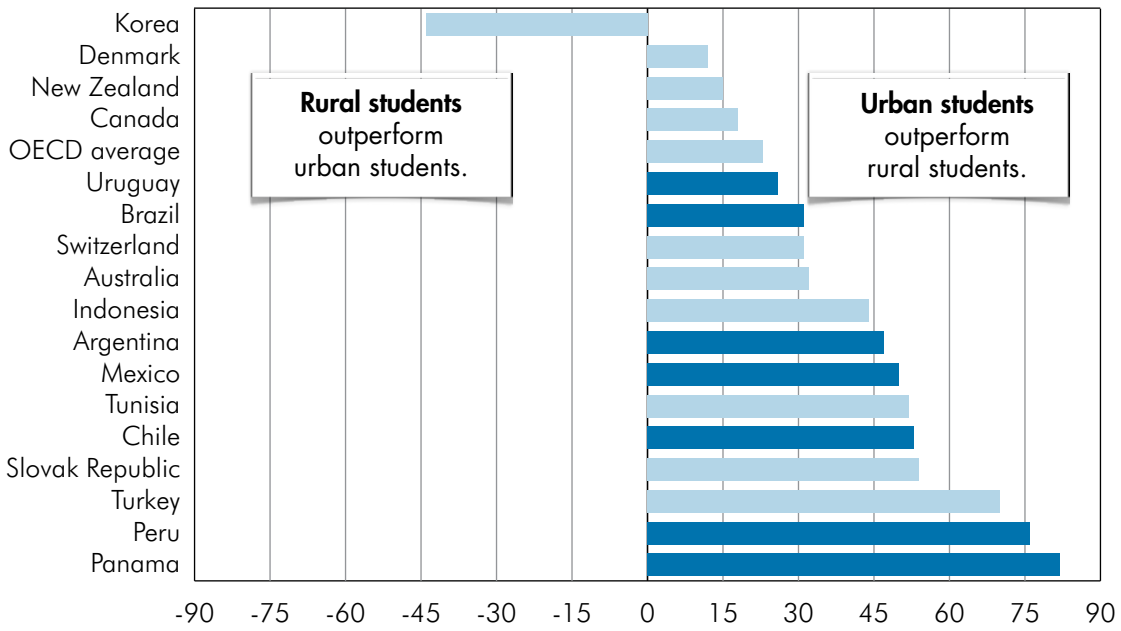


Source: OECD (2010). PISA 2009, Vol. I, Table I.3.6. Notes: (1) Of the 65 countries, 33 had statistically significant gender gaps in science. This graph only includes countries with statistically significant gaps. It shows the top three performers in this indicator (i.e., countries with the smallest gaps), Latin American countries and one per region (Africa, Asia, Oceania, Eastern Europe, Middle East, North America, Western Europe), and the OECD average, provided that they have a statistically significant gap. (2) OECD average includes all 34 member countries.

How Do Urban and Rural Students Perform?

Rural students in Latin America and the Caribbean lag behind their urban peers, even after accounting for family income.

Graph 22. Difference in mean scores between students in urban and rural schools on PISA reading test, 2009

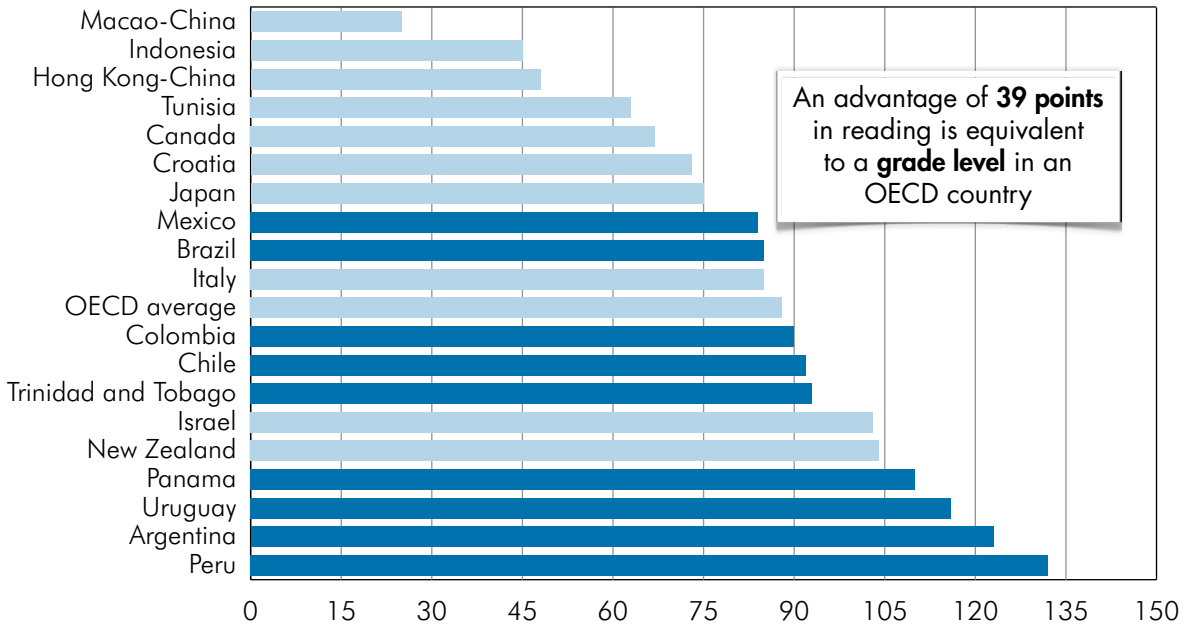


Source: OECD (2010). PISA 2009, Vol. II, Table II.2.6. Notes: (1) Urban schools in this graph includes both small and large cities. These calculations control for differences in family income. (2) Country selection criterion is the same as in previous sections. (3) OECD average includes all 34 member countries. (4) An advantage of 39 points in reading is equivalent to a grade level in an OECD country.

How Do Rich and Poor Students Perform?

Poor students in the region are more than two grade levels below their rich peers in reading.

Graph 23. Difference in mean scores between rich and poor students on PISA reading test, 2009

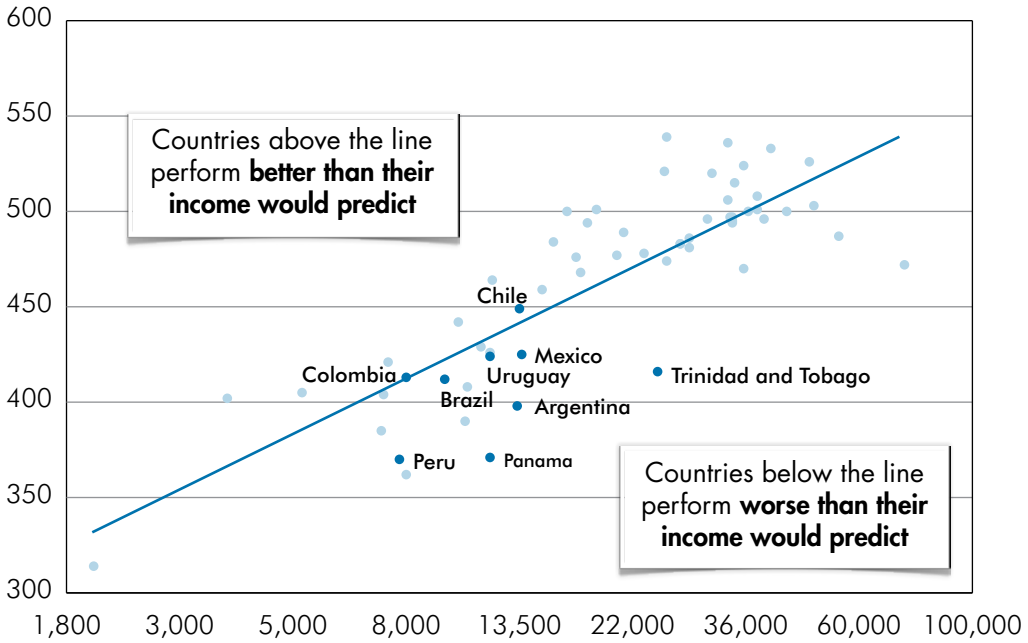


Source: OECD (2010). PISA 2009, Vol. II, Table II.3.1. Notes: (1) Gaps show the difference in mean scores of students at the top and bottom quarters of PISA's index of economic, social, and cultural status. (2) Differences were statistically significant in all participating countries, but this graph includes only the top three performers in this indicator (i.e., countries with the smallest gaps), Latin American and Caribbean countries, one country per region, and the OECD average.

Do Richer Countries Perform Better?

On average, richer countries perform better than poorer countries in all subjects.

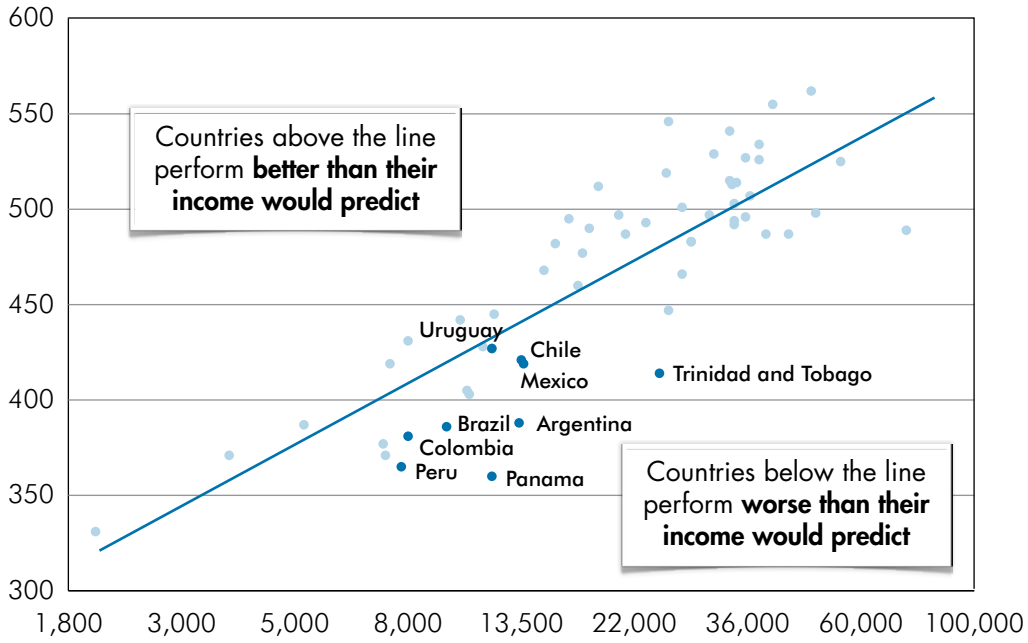
Graph 24. Mean scores on PISA reading test by income per capita, 2009



Source: OECD (2010). PISA 2009, Vol. I, Table I.A. Income data from the World Bank's World DataBank: http://databank.worldbank.org/. Notes: (1) This graph excludes Chinese Taipei, Dubai (UAE), Liechtenstein, Qatar and Shanghai-China, which reported no income data. (2) X-axis shows gross domestic product per capita for 2009 in 2005 constant dollars in purchasing power parity terms, in log scale.

Latin American and Caribbean countries tend to perform below what their income would predict.

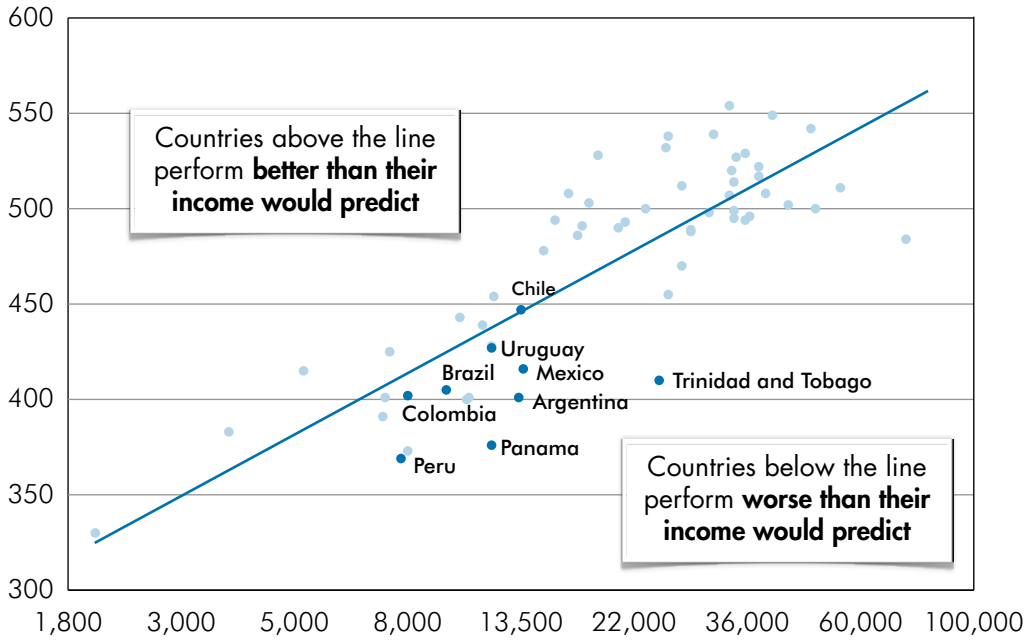
Graph 25. Mean scores on PISA math test by income per capita, 2009



Source: OECD (2010). PISA 2009, Vol. I, Table I.A. Income data from the World Bank's World DataBank: http://databank.worldbank.org/. Notes: (1) This graph excludes Chinese Taipei, Dubai (UAE), Liechtenstein, Qatar and Shanghai-China, which reported no income data. (2) X-axis shows gross domestic product per capita for 2009 in 2005 constant dollars in purchasing power parity terms, in log scale.

Chile performs better than its income would predict in reading and science. Colombia does so in reading.

Graph 26. Mean scores on PISA science test by income per capita, 2009

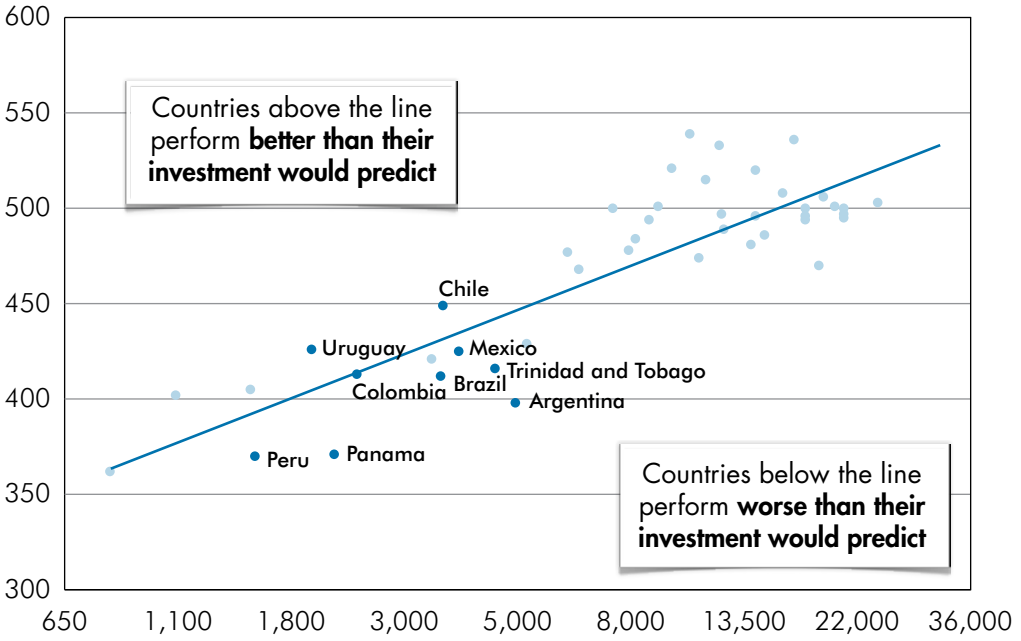


Sources: OECD (2010). PISA 2009, Vol. I, Table I.A. Income data from the World Bank's World DataBank: http://databank.worldbank.org/. Notes: (1) This graph excludes Chinese Taipei, Dubai (UAE), Liechtenstein, Qatar and Shanghai-China, which reported no income data. (2) X-axis shows gross domestic product per capita for 2009 for 2005 constant dollars in purchasing power parity terms, in log scale.

Do Countries That Invest More in Education Perform Better?

On average, countries that invest more per student perform better in all subjects.

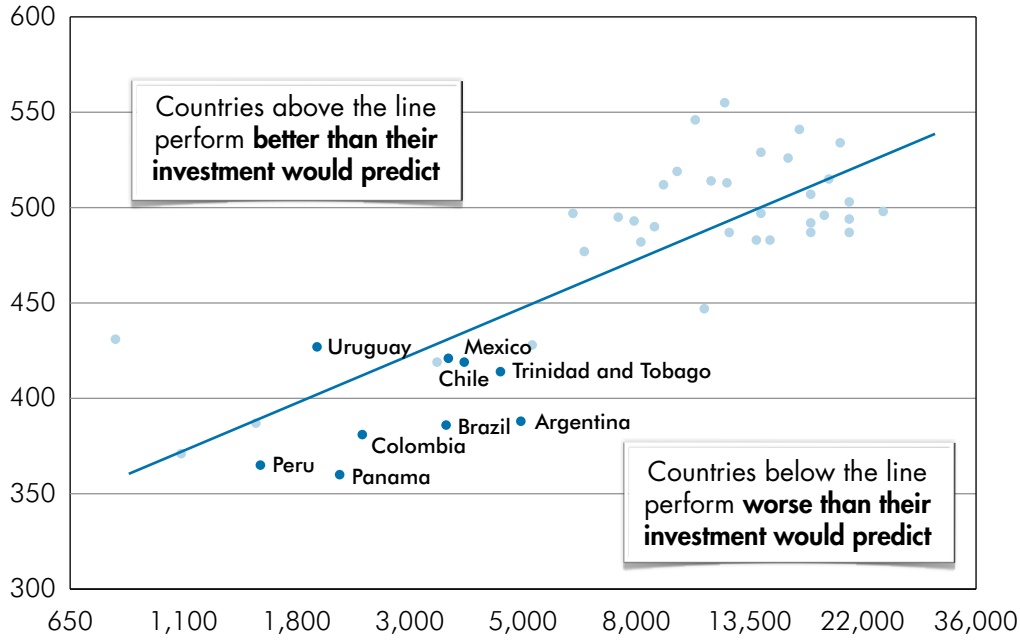
Graph 27. Mean scores on PISA reading test by investment per student in primary and secondary education, 2009



Sources: OECD (2010). PISA 2009, Vol. I, Table I.A. Spending data from UNESCO (2010). Global Education Digest 2010,Table 13. Notes: (1) This graph excludes 21 education systems participating in PISA 2009, which did not report spending data for primary and secondary in 2005 PPP terms. (2) X-axis shows total public expenditure per student in primary and secondary school for 2008 in 2005 U.S. constant dollars in purchasing power parity terms, in log scale.

Latin American and Caribbean countries tend to perform below what their investment per student would predict.

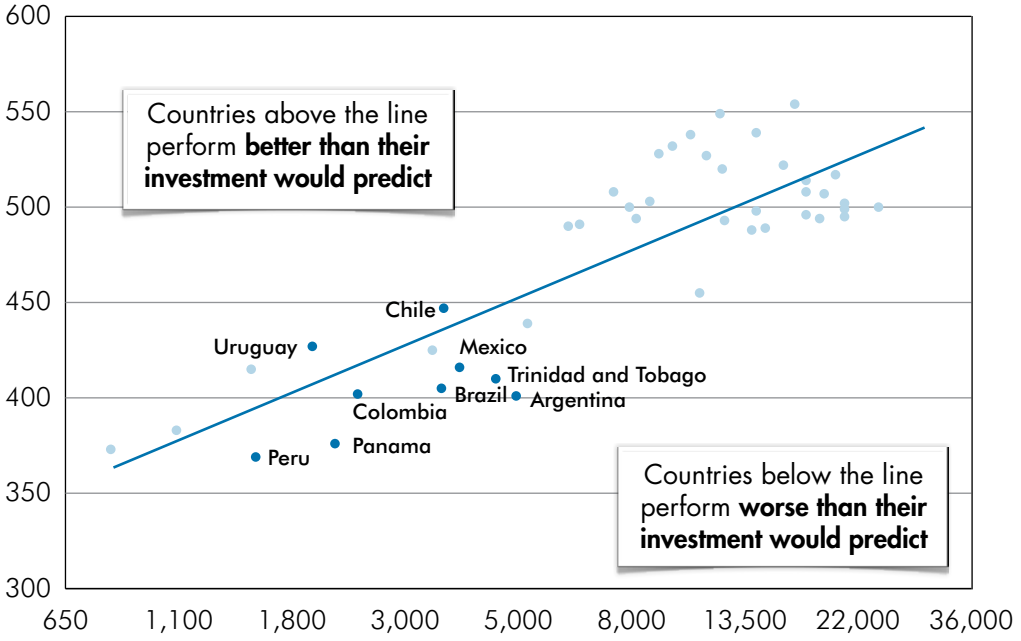
Graph 28. Mean scores on PISA math test by investment per student in primary and secondary education, 2009



Sources: OECD (2010). PISA 2009, Vol. I, Table I.A. Spending data from UNESCO (2010). Global Education Digest 2010,Table 13. Notes: (1) This graph excludes 21 education systems participating in PISA 2009, which did not report spending data for primary and secondary in 2005 PPP terms. (2) X-axis shows total public expenditure per student in primary and secondary school for 2008 in 2005 U.S. constant dollars in purchasing power parity terms, in log scale.

Uruguay is the only country in the region that performs above what its investment level would predict in all subjects. Chile does so in reading and science.

Graph 29. Mean scores on PISA science test by investment per student in primary and secondary education, 2009



Sources: OECD (2010). PISA 2009, Vol. I, Table I.A. Spending data from UNESCO (2010). Global Education Digest 2010,Table 13. Notes: (1) This graph excludes 21 education systems participating in PISA 2009, which did not report spending data for primary and secondary in 2005 PPP terms. (2) X-axis shows total public expenditure per student in primary and secondary school for 2008 in 2005 U.S. constant dollars in purchasing power parity terms, in log scale.

Why Should We Care About These Findings?

Student learning is important by itself, but also helps reach other key objectives.

Latin American and Caribbean countries need to focus on raising student learning if they are to reach acceptable levels of social and economic progress. Studies in recent years have found that student learning is linked to:

- ✓ **Higher economic growth.** Countries with higher levels of student learning grow more. In fact, getting more children and youth in school has virtually no impact on a country's growth prospects unless schools raise students' skills.

- ✓ **Higher and more equitable wages.** Higher-skilled individuals earn considerably higher wages in the labor market. Also, countries with more equitable distributions of skills have more equitable income distributions.

- ✓ **More democratic nations.** More educated individuals are more likely to engage in civic participation, such as voting and organizing. They also have a strong incentive to favor democratic over non-democratic regimes.

- ✓ **Increased competitiveness.** The number of top performers a country produces is highly correlated with its competitive edge in the world economy. This is particularly true of countries that graduate top students in subjects such as science and engineering.

These studies are suggestive, rather than definitive. Yet, they offer good reasons for countries in the region to ensure that their schools are providing quality education for all.

About the Authors

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The Partnership for Educational Revitalization in the Americas (PREAL) is a joint project of the Inter-American Dialogue in Washington, DC, and the Corporation for Development Research (CINDE) in Santiago, Chile. PREAL's activities are made possible by the generous support of the American people through the United States Agency for International Development (USAID), and by the Inter-American Development Bank (IDB), the GE Foundation, the International Association for the Evaluation of Educational Achievement (IEA), the World Bank, and others. However, the contents of this document are the sole responsibility of the authors and do not necessarily reflect the views of PREAL or any of its donors.

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