

### Why do we need creative problem-solving?

- Some 11.4% of 15-year-old students in OECD countries are top performers in problem-solving.
- About one in five students is able to solve only straightforward problems –if any – provided that they refer to familiar situations.
- Boys outperform girls in problem solving in more than half of the countries and economies surveyed.

#### Significance

Changes in society, the environment, and in technology mean that knowledge evolves rapidly. Adapting, learning, daring to try out new things and always being ready to learn from mistakes are among the keys to resilience and success in an unpredictable world. Few workers today, whether in manual or knowledge-based occupations, use repetitive actions to perform their job tasks, and one in ten is confronted every day with more complex problems that require at least 30 minutes to solve. Complex problem-solving skills are particularly in demand in fast-growing, highly skilled managerial, professional and technical occupations. This section presents the findings of the PISA 2012 assessment on problem solving, administered in 44 countries and economies.

#### Findings

A top-performing student in problem solving can devise multi-step solutions to complete complex problems efficiently. Among OECD countries, 11.4% of 15-year-old students are top performers in problem solving. In Singapore, Korea and Japan, more than one in five students achieve this high level and more than one in six students in Hong Kong-China, Chinese Taipei and Shanghai-China, Canada and Australia. However, about one in five students living in an OECD country is only able to solve straightforward problems, provided that they refer to familiar situations. In Montenegro, Malaysia, Colombia, Uruguay, Bulgaria and Brazil less than 2% of students are top-performers.

Students in East Asia obtain the highest scores in problem solving, ranging from 562 points in Singapore to 534 points in Chinese Taipei. In the OECD, 12 countries score above the average, with Canada attaining a high of 526 points. Although East Asian countries score the highest, students in Australia, Brazil, Italy, Japan, Korea, Macao-China, Serbia, England (United Kingdom) and the United States perform significantly better in problem solving, on average, than students in other countries who have similar levels in mathematics, reading and science.

Many of the best-performing countries and economies in problem solving perform well on tasks related to acquiring knowledge (such as “exploring and understanding” and “representing and formulating” tasks), and relatively low

on tasks involving only the use of knowledge and that do not require substantial understanding or representation of the problem situation. Meanwhile, students in Brazil, Ireland, Korea and the United States perform strongest on interactive problems (those that require the student to uncover some of the information needed to solve the problem) compared to static problems (those that have all information disclosed at the outset).

Boys score seven points higher than girls in problem solving, on average among OECD countries. In 23 of the countries and economies surveyed, boys outperform girls. The largest differences are in Colombia, Shanghai-China, Brazil and the Slovak Republic, where boys score more than 20 points higher. Among the exceptions are the United Arab Emirates, Bulgaria, Finland and Montenegro, where girls outperform boys, on average. In 16 countries and economies, there is no significant difference in average performance in problem-solving between boys and girls.

#### Definitions

Results are based on student assessments administered as part of the PISA 2012 round undertaken by the OECD. The term students refers to 15-year-olds enrolled in an educational institution at secondary level, regardless of the grade level, type of institution or whether they attended school full-time or part-time.

Information on data for Israel:  
<http://dx.doi.org/10.1787/888932315602>.

#### Going further

For additional material, notes and a full explanation of sourcing and methodologies see *PISA 2012 Results: Creative Problem Solving (Volume V)*.

Areas covered include:

- Distribution of student performance in creative problem solving.
- Mean score and gender differences in student performances.

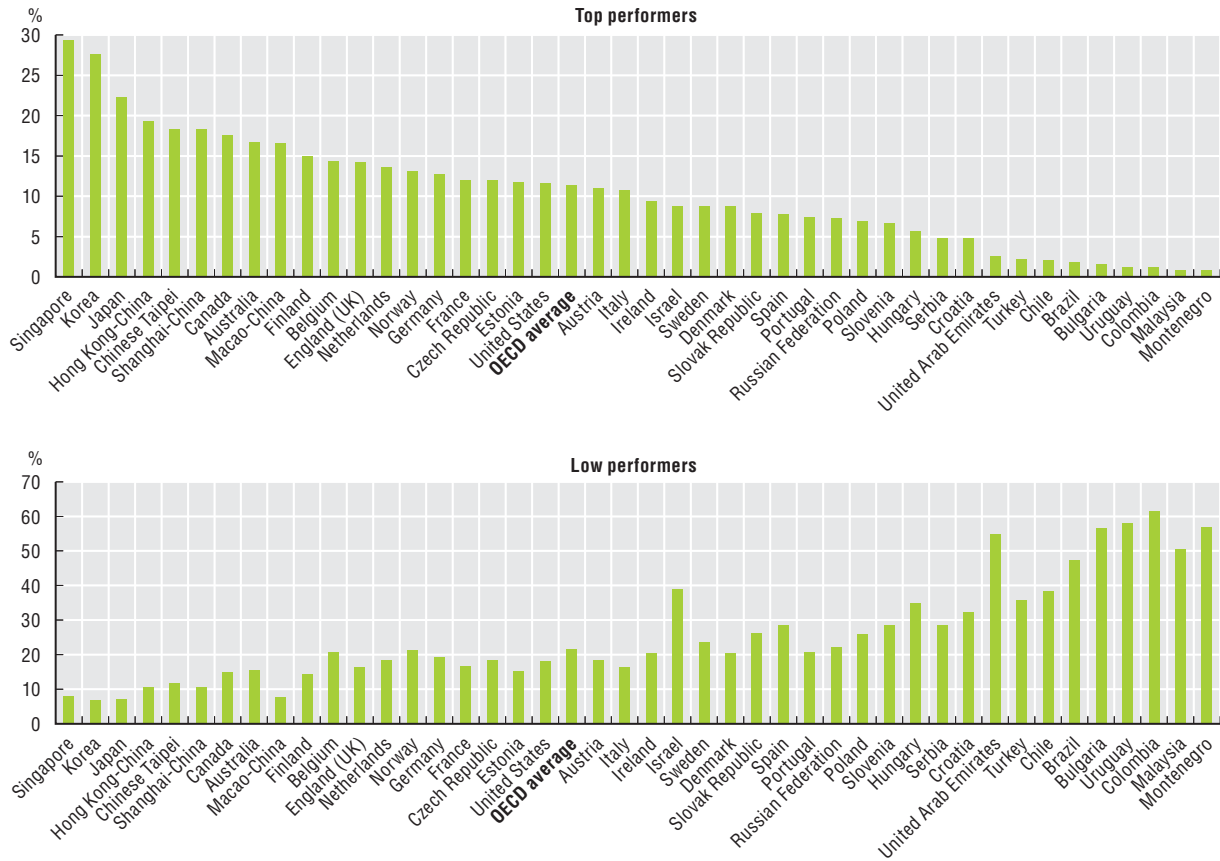
#### Further reading from OECD

OECD (2014), *PISA 2012 Results: Creative Problem Solving (Volume V): Students' Skills in Tackling Real-Life Problems*, PISA, OECD Publishing, Paris,  
<http://dx.doi.org/10.1787/9789264208070-en>.

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Figure 6.7. Proficiency in problem-solving, 2012

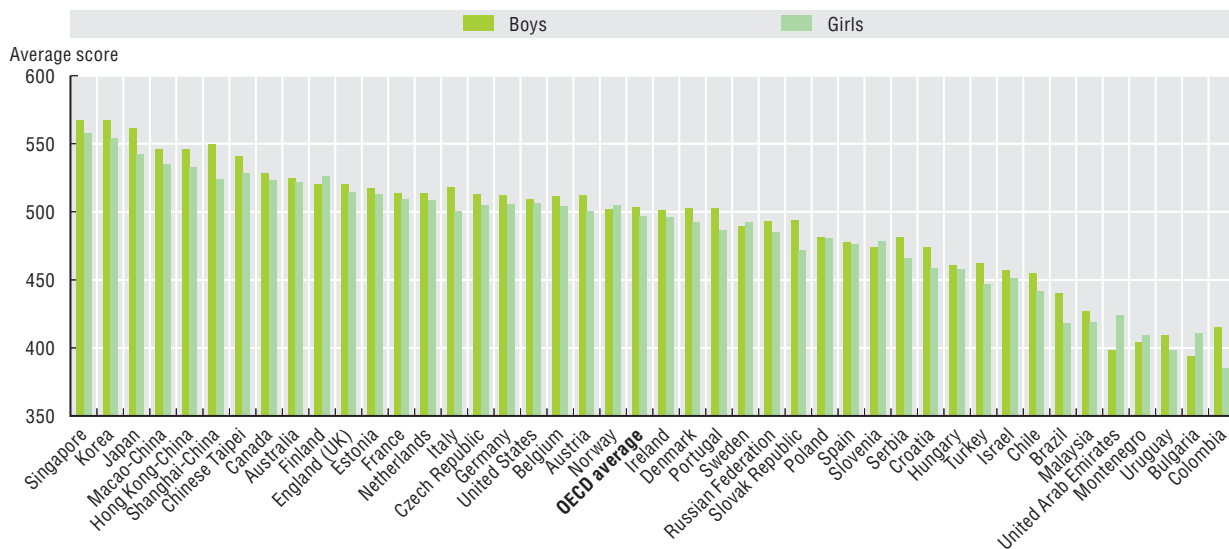
These figures show the average scores of students in the PISA test on problem-solving.



Source: OECD (2014), PISA 2012 Results: Creative Problem Solving (Volume V), Figure V.2.4., available at <http://dx.doi.org/10.1787/888933003573>.

Figure 6.8. Gender differences in problem-solving, 2012

This figure shows the average scores of boys and girls in the PISA test on problem-solving.



Source: OECD (2014), PISA 2012 Results: Creative Problem Solving (Volume V), Figure V.4.4., available at <http://dx.doi.org/10.1787/888933003611>.



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