Introduction to PISA

THE PISA SURVEYS

Are students well prepared to meet the challenges of the future? Can they analyse, reason and communicate their ideas effectively? Have they found the kinds of interests they can pursue throughout their lives as productive members of the economy and society? The OECD Programme for International Student Assessment (PISA) seeks to answer these questions through its triennial surveys of key competencies of 15-year-old students in OECD member countries and partner countries/economies. Together, the group of countries participating in PISA represents nearly 90% of the world economy.[1]

PISA assesses the extent to which students near the end of compulsory education have acquired some of the knowledge and skills that are essential for full participation in modern societies, with a focus on reading, mathematics and science.

PISA has now completed its fourth round of surveys. Following the detailed assessment of each of PISA's three main subjects – reading, mathematics and science – in 2000, 2003 and 2006, the 2009 survey marks the beginning of a new round with a return to a focus on reading, but in ways that reflect the extent to which reading has changed since 2000, including the prevalence of digital texts.

PISA 2009 offers the most comprehensive and rigorous international measurement of student reading skills to date. It assesses not only reading knowledge and skills, but also students' attitudes and their learning strategies in reading. PISA 2009 updates the assessment of student performance in mathematics and science as well.

The assessment focuses on young people's ability to use their knowledge and skills to meet real-life challenges. This orientation reflects a change in the goals and objectives of curricula themselves, which are increasingly concerned with what students can do with what they learn at school and not merely with whether they have mastered specific curricular content.

PISA's unique features include its:

- Policy orientation, which connects data on student learning outcomes with data on students' characteristics and on key factors shaping their learning in and out of school in order to draw attention to differences in performance patterns and identify the characteristics of students, schools and education systems that have high performance standards.

- Innovative concept of "literacy", which refers to the capacity of students to apply knowledge and skills in key subject areas and to analyse, reason and communicate effectively as they pose, interpret and solve problems in a variety of situations.

- Relevance to lifelong learning, which does not limit PISA to assessing students' competencies in school subjects, but also asks them to report on their own motivations to learn, their beliefs about themselves and their learning strategies.

- Regularity, which enables countries to monitor their progress in meeting key learning objectives.

- Breadth of geographical coverage and collaborative nature, which, in PISA 2009, encompasses the 34 OECD member countries and 41 partner countries and economies.[2]

The relevance of the knowledge and skills measured by PISA is confirmed by studies tracking young people in the years after they have been assessed by PISA. Longitudinal studies in Australia, Canada and Switzerland display a strong relationship between performance in reading on the PISA assessment at age 15 and future educational attainment and success in the labour market (see Volume I Chapter 2).[3]

The frameworks for assessing reading, mathematics and science in 2009 are described in detail in *PISA 2009 Assessment Framework: Key Competencies in Reading, Mathematics and Science* (OECD, 2009).

Decisions about the scope and nature of the PISA assessments and the background information to be collected are made by leading experts in participating countries. Governments guide these decisions based on shared, policy-driven interests. Considerable efforts and resources are devoted to achieving cultural and linguistic breadth and balance in the assessment materials. Stringent quality-assurance mechanisms are applied in designing the test, in translation, sampling and data collection. As a result, PISA findings are valid and highly reliable.

Policy makers around the world use PISA findings to gauge the knowledge and skills of students in their own country in comparison with those in other countries. PISA reveals what is possible in education by showing what students in the highest performing countries can do in reading, mathematics and science. PISA is also used to gauge the pace of educational progress by allowing policy makers to assess to what extent performance changes observed nationally are in line with performance changes observed elsewhere. In a growing number of countries, PISA is also used to set policy targets against measurable goals achieved by other systems, to initiate research and peer-learning designed to identify policy levers and to reform trajectories for improving education. While PISA cannot identify cause-and-effect relationships between inputs, processes and educational outcomes, it can highlight key features in which education systems are similar and different, sharing those findings with educators, policy makers and the general public.

THE FIRST REPORT FROM THE 2009 ASSESSMENT

This volume is the third of six volumes that provide the first international report on results from the PISA 2009 assessment. It explores the information gathered on students' levels of engagement in reading activities and attitudes towards reading and learning and describes 15-year-olds' motivations, engagement and learning strategies.

The other volumes cover the following issues:

- Volume I, *What Students Know and Can Do: Student Performance in Reading, Mathematics and Science*, summarises the performance of students in PISA 2009, starting with a focus on reading, and then reporting on mathematics and science performance. It provides the results in the context of how performance is defined, measured and reported, and then examines what students are able to do in reading. After a summary of reading performance, it examines the ways in which this performance varies on subscales representing three aspects of reading. It then breaks down results by different formats of reading texts and considers gender differences in reading, both generally and for different reading aspects and text formats. Any comparison of the outcomes of education systems needs to take into consideration countries' social and economic circumstances and the resources they devote to education. To address this, the volume also interprets the results within countries' economic and social contexts. The chapter concludes with a description of student results in mathematics and science.

- Volume II, *Overcoming Social Background: Equity in Learning Opportunities and Outcomes,* starts by closely examining the performance variation shown in Volume I, particularly the extent to which the overall variation in student performance relates to differences in results achieved by different schools. The volume then looks at how factors such as socio-economic background and immigrant status affect student and school performance, and the role that education policy can play in moderating the impact of these factors.

- Volume IV, *What Makes a School Successful? Resources, Policies and Practices,* explores the relationships between student-, school- and system-level characteristics, and educational quality and equity. It explores what schools and school policies can do to raise overall student performance and, at the same time, moderate the impact of socio-economic background on student performance, with the aim of promoting a more equitable distribution of learning opportunities.

- Volume V, *Learning Trends: Changes in Student Performance Since 2000*, provides an overview of trends in student performance in reading, mathematics and science from PISA 2000 to PISA 2009. It shows educational outcomes over time and tracks changes in factors related to student and school performance, such as student background and school characteristics and practices.

- Volume VI, *Students On Line: Reading and Using Digital Information* explains how PISA measures and reports student performance in digital reading and analyses what students in the 20 countries participating in this assessment are able to do.

All data tables referred to in the analysis are included at the end of the respective volume. A Reader's Guide is also provided in each volume to aid in interpreting the tables and figures accompanying the report.

Technical annexes that describe the construction of the questionnaire indices, sampling issues, quality assurance procedures and the process followed for developing the assessment instruments, and information about reliability of coding are posted on the OECD PISA website (*www.pisa.oecd.org*). Many of the issues covered in the technical annexes are elaborated in greater detail in the *PISA 2009 Technical Report* (OECD, forthcoming).

THE PISA STUDENT POPULATION

In order to ensure the comparability of results across countries, PISA devoted a great deal of attention to assessing comparable target populations. Differences between countries in the nature and extent of pre-primary education and care, in the age of entry to formal schooling, and in the structure of the education system do not allow school grade levels to be defined so that they are internationally comparable. Valid international comparisons of educational performance, therefore, need to define their populations with reference to a target age. PISA covers students who are aged between 15 years 3 months and 16 years 2 months at the time of the assessment and who have completed at least 6 years of formal schooling, regardless of the type of institution in which they are enrolled, whether they are in full-time or part-time education, whether they attend academic or vocational programmes, and whether they attend public or private schools or foreign schools within the country. (For an operational definition of this target population, see the *PISA 2009 Technical Report* [OECD, forthcoming].) The use of this age in PISA, across countries and over time, allows the performance of students to be compared in a consistent manner before they complete compulsory education.

As a result, this report can make statements about the knowledge and skills of individuals born in the same year who are still at school at 15 years of age, despite having had different educational experiences, both in and outside school.

Stringent technical standards were established to define the national target populations and to identify permissible exclusions from this definition (for more information, see the PISA website *www.pisa.oecd.org*). The overall exclusion rate within a country was required to be below 5% to ensure that, under reasonable assumptions, any distortions in national mean scores would remain within plus or minus 5 score points, i.e. typically within the order of magnitude of two standard errors of sampling (see Box I.1.2). Exclusion could take place either through schools that participated or students who participated within schools. There are several reasons why a school or a student could be excluded from PISA. Schools might be excluded because they are situated in remote regions and are inaccessible or because they are very small, or because of organisational or operational factors that precluded participation. Students might be excluded because of intellectual disability or limited proficiency in the language of the test.

In 29 out of 65 countries participating in PISA 2009, the percentage of school-level exclusions amounted to less than 1%; it was less than 5% in all countries. When the exclusion of students who met the internationally established exclusion criteria is also taken into account, the exclusion rates increase slightly. However, the overall exclusion rate remains below 2% in 32 participating countries, below 5% in 60 participating countries, and below 7% in all countries except Luxembourg (7.2%) and Denmark (8.6%). In 15 out of 34 OECD countries, the percentage of school-level exclusions amounted to less than 1% and was less than 5% in all countries. When student exclusions within schools are also taken into account, there were 9 OECD countries below 2% and 25 countries below 5%. Restrictions on the level of exclusions in PISA 2009 are described in Annex A2.

The specific sample design and size for each country aimed to maximise sampling efficiency for student-level estimates. In OECD countries, sample sizes ranged from 4 410 students in Iceland to 38 250 students in Mexico. Countries with large samples have often implemented PISA both at national and regional/state levels (*e.g.* Australia, Belgium, Canada, Italy, Mexico, Spain, Switzerland and the United Kingdom). This selection of samples was monitored internationally and adhered to rigorous standards for the participation rate, both among schools selected by the international contractor and among students within these schools, to ensure that the PISA results reflect the skills of the 15-year-old students in participating countries. Countries were also required to administer the test to students in identical ways to ensure that students receive the same information prior to and during the test (for details, see Annex A4).

Box III.A **Key features of PISA 2009**

Content

- The main focus of PISA 2009 was reading. The survey also updated performance assessments in mathematics and science. PISA considers students' knowledge in these areas not in isolation, but in relation to their ability to reflect on their knowledge and experience and to apply them to real-world issues. The emphasis is on mastering processes, understanding concepts and functioning in various contexts within each assessment area.

- For the first time, the PISA 2009 survey also assessed 15-year-old students' ability to read, understand and apply digital texts.

Methods

- Around 470 000 students completed the assessment in 2009, representing about 26 million 15-year-olds in the schools of the 65 participating countries and economies. Some 50 000 students took part in a second round of this assessment in 2010, representing about 2 million 15-year-olds from 10 additional partner countries and economies.

- Each participating student spent two hours carrying out pencil-and-paper tasks in reading, mathematics and science. In 20 countries, students were given additional questions via computer to assess their capacity to read digital texts.

- The assessment included tasks requiring students to construct their own answers as well as multiple-choice questions. The latter were typically organised in units based on a written passage or graphic, much like the kind of texts or figures that students might encounter in real life.

- Students also answered a questionnaire that took about 30 minutes to complete. This questionnaire focused on their background, learning habits, attitudes towards reading, and their involvement and motivation.

- School principals completed a questionnaire about their school that included demographic characteristics and an assessment of the quality of the learning environment at school.

Outcomes

PISA 2009 results provide:

- a profile of knowledge and skills among 15-year-olds in 2009, consisting of a detailed profile for reading and an update for mathematics and science;

- contextual indicators relating performance results to student and school characteristics;

- an assessment of students' engagement in reading activities, and their knowledge and use of different learning strategies;

- a knowledge base for policy research and analysis; and

- trend data on changes in student knowledge and skills in reading, mathematics, science, changes in student attitudes and socio-economic indicators, and in the impact of some indicators on performance results.
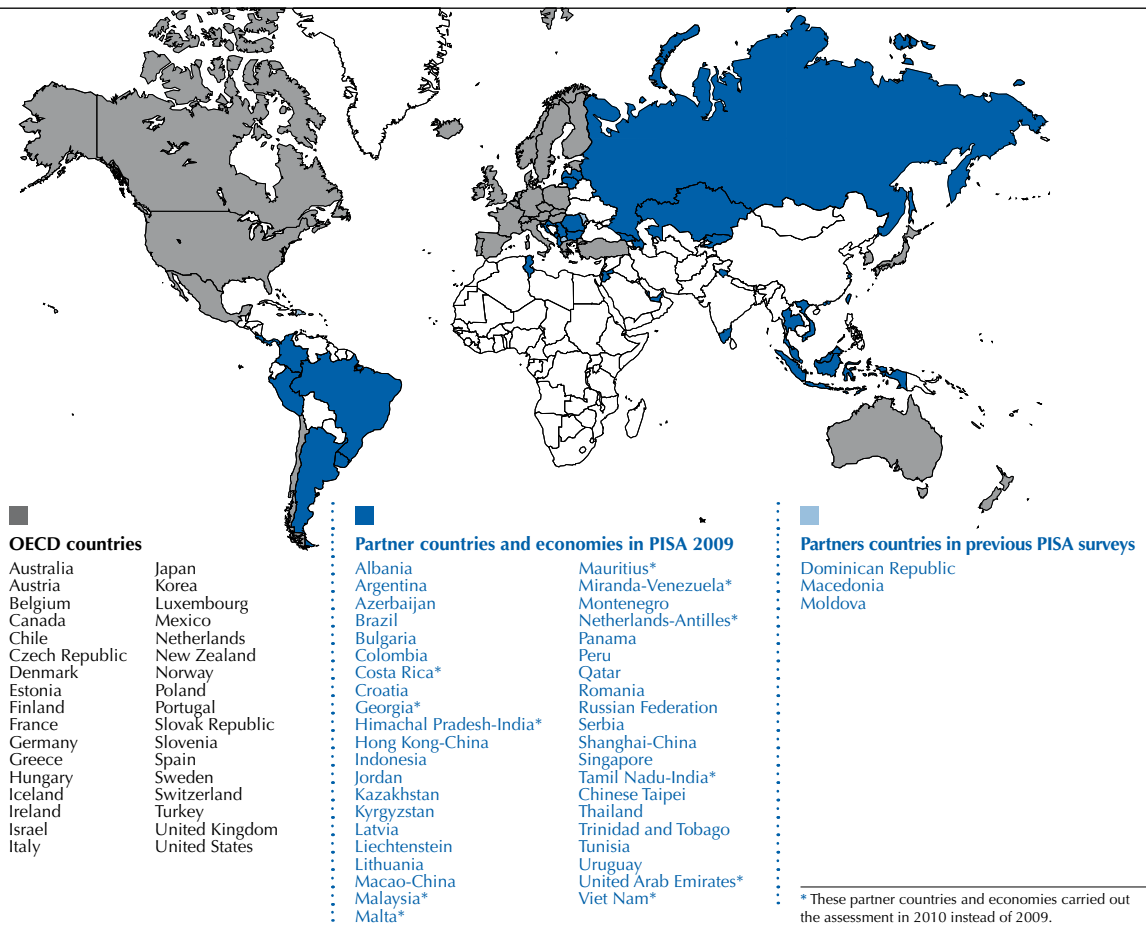
Future assessments

- The PISA 2012 survey will return to mathematics as the major assessment area, PISA 2015 will focus on science. Thereafter, PISA will turn to another cycle beginning with reading again.

- Future tests will place greater emphasis on assessing students' capacity to read and understand digital texts and solve problems presented in a digital format, reflecting the importance of information and computer technologies in modern societies.
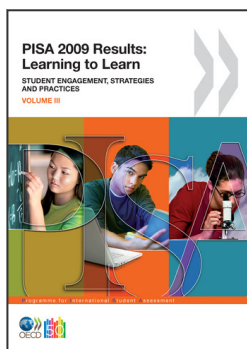
■ Figure III.A ■
A map of PISA countries and economies

OECD countries

Australia	Japan
Austria	Korea
Belgium	Luxembourg
Canada	Mexico
Chile	Netherlands
Czech Republic	New Zealand
Denmark	Norway
Estonia	Poland
Finland	Portugal
France	Slovak Republic
Germany	Slovenia
Greece	Spain
Hungary	Sweden
Iceland	Switzerland
Ireland	Turkey
Israel	United Kingdom
Italy	United States

Partner countries and economies in PISA 2009

Albania	Mauritius*
Argentina	Miranda-Venezuela*
Azerbaijan	Montenegro
Brazil	Netherlands-Antilles*
Bulgaria	Panama
Colombia	Peru
Costa Rica*	Qatar
Croatia	Romania
Georgia*	Russian Federation
Himachal Pradesh-India*	Serbia
Hong Kong-China	Shanghai-China
Indonesia	Singapore
Jordan	Tamil Nadu-India*
Kazakhstan	Chinese Taipei
Kyrgyzstan	Thailand
Latvia	Trinidad and Tobago
Liechtenstein	Tunisia
Lithuania	Uruguay
Macao-China	United Arab Emirates*
Malaysia*	Viet Nam*
Malta*	

Partners countries in previous PISA surveys

Dominican Republic
Macedonia
Moldova

* These partner countries and economies carried out the assessment in 2010 instead of 2009.

Notes

1. The GDP of countries that participated in PISA 2009 represents 87% of the 2007 world GDP. Some of the entities represented in this report are referred to as partner economies. This is because they are not strictly national entities.

2. Thirty-one partner countries and economies originally participated in the PISA 2009 assessment and ten additional partner countries and economies took part in a second round of the assessment.

3. Marks, G.N (2007); Bertschy, K., M.A. Cattaneo and S.C. Wolter (2009); OECD (2010a).