



# What is PISA?

“What is important for citizens to know and be able to do?” In response to that question and to the need for internationally comparable evidence on student performance, the Organisation for Economic Co-operation and Development (OECD) launched the triennial survey of 15-year-old students around the world known as the Programme for International Student Assessment, or PISA. PISA assesses the extent to which 15-year-old students, near the end of their compulsory education, have acquired the key knowledge and skills that are essential for full participation in modern societies. The assessment focuses on the core school subjects of science, reading and mathematics. Students’ proficiency in an innovative domain is also assessed (in 2015, this domain is collaborative problem solving). The assessment does not just ascertain whether students can reproduce knowledge; it also examines how well students can extrapolate from what they have learned and can apply that knowledge in unfamiliar settings, both in and outside of school. This approach reflects the fact that modern economies reward individuals not for what they know, but for what they can do with what they know.

PISA is an ongoing programme that offers insights for education policy and practice, and that helps monitor trends in students’ acquisition of knowledge and skills across countries and in different demographic subgroups within each country. PISA results reveal what is possible in education by showing what students in the highest-performing and most rapidly improving education systems can do. The findings allow policy makers around the world to gauge the knowledge and skills of students in their own countries in comparison to those in other countries, set policy targets against measurable goals achieved by other education systems, and learn from policies and practices applied elsewhere. While PISA cannot identify cause-and-effect relationships between policies/practices and student outcomes, it can show educators, policy makers and the interested public how education systems are similar and different – and what that means for students.

## WHAT IS UNIQUE ABOUT PISA?

PISA is different from other international assessments in its:

- **policy orientation**, which links data on student learning outcomes with data on students’ backgrounds and attitudes towards learning, and on key factors that shape their learning, in and outside of school, in order to highlight differences in performance and identify the characteristics of students, schools and education systems that perform well
- **innovative concept of “literacy”**, which refers to students’ capacity to apply knowledge and skills in key subjects, and to analyse, reason and communicate effectively as they identify, interpret and solve problems in a variety of situations
- **relevance to lifelong learning**, as PISA asks students to report on their motivation 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 coverage**, which, in PISA 2015, encompasses all 35 OECD countries and 37 partner countries and economies.



### Box A. PISA's contributions to the Sustainable Development Goals

The Sustainable Development Goals (SDGs) were adopted by the United Nations in September 2015. Goal 4 of the SDGs seeks to ensure “inclusive and equitable quality education and [to] promote lifelong learning opportunities for all”. More specific targets and indicators spell out what countries need to deliver by 2030. Goal 4 differs from the Millennium Development Goals (MDGs) on education, which were in place between 2000 and 2015, in the following two ways:

- Goal 4 is truly global. The SDGs establish a universal agenda; they do not differentiate between rich and poor countries. Every single country is challenged to achieve the SDGs.
- Goal 4 puts the quality of education and learning outcomes front and centre. Access, participation and enrolment, which were the main focus of the MDG agenda, are still important, and the world is still far from providing equitable access to high-quality education for all. But participation in education is not an end in itself; what matters for people and economies are the skills acquired through education. It is the competence and character qualities that are developed through schooling, rather than the qualifications and credentials gained, that make people successful and resilient in their professional and personal lives. They are also key in determining individual well-being and the prosperity of societies.

In sum, Goal 4 requires education systems to monitor the actual learning outcomes of their young people. PISA, which already provides measurement tools to this end, is committed to improving, expanding and enriching its assessment tools. For example, PISA 2015 assesses the performance in science, reading and mathematics of 15-year-old students in more than 70 high- and middle-income countries. PISA offers a comparable and robust measure of progress so that all countries, regardless of their starting point, can clearly see where they are on the path towards the internationally agreed targets of quality and equity in education.

Through participation in PISA, countries can also build their capacity to develop relevant data. While most countries that have participated in PISA already have adequate systems in place, that isn't true for many low-income countries. To this end, the OECD PISA for Development initiative not only aims to expand the coverage of the international assessment to include more middle- and low-income countries, but it also offers these countries assistance in building their national assessment and data-collection systems. PISA is also expanding its assessment domains to include other skills relevant to Goal 4. In 2015, for example, PISA assesses 15-year-old students' ability to solve problems collaboratively.

Other OECD data, such as those derived from the Survey of Adult Skills (a product of the OECD Programme for the International Assessment of Adult Competencies [PIAAC]) and the OECD Teaching and Learning International Survey (TALIS), provide a solid evidence base for monitoring education systems. OECD analyses promote peer learning as countries can compare their experiences in implementing policies. Together, OECD indicators, statistics and analyses can be seen as a model of how progress towards the SDG education goal can be measured and reported.

**Source:** OECD (2016), *Education at a Glance 2016: OECD Indicators*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/eag-2016-en>.

## WHICH COUNTRIES AND ECONOMIES PARTICIPATE IN PISA?

PISA is now used as an assessment tool in many regions around the world. It was implemented in 43 countries and economies in the first assessment (32 in 2000 and 11 in 2002), 41 in the second assessment (2003), 57 in the third assessment (2006), 75 in the fourth assessment (65 in 2009 and 10 in 2010), and 65 in the fifth assessment. A total of 72 countries and economies participated in PISA 2015.

In addition to all OECD countries, the 2015 survey was conducted in:

- **East, South and Southeast Asia:** Beijing, Shanghai, Jiangsu and Guangdong (China), Hong Kong (China), Indonesia, Macao (China), Malaysia, Singapore, Chinese Taipei, Thailand and Viet Nam
- **Central, Mediterranean and Eastern Europe, and Central Asia:** Albania, Bulgaria, Croatia, Georgia, Kazakhstan, Kosovo, Lebanon, Lithuania, the former Yugoslav Republic of Macedonia, Malta, Moldova, Montenegro, Romania and the Russian Federation



- **The Middle East:** Jordan, Qatar and the United Arab Emirates
- **Central and South America:** Argentina, Brazil, Colombia, Costa Rica, Dominican Republic, Peru, Puerto Rico, Trinidad and Tobago, Uruguay
- **Africa:** Algeria and Tunisia.

**Map of PISA countries and economies**



#### OECD countries

Australia	Korea
Austria	Latvia
Belgium	Luxembourg
Canada	Mexico
Chile	The 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
Japan	

#### Partner countries and economies in PISA 2015

Albania	Lithuania
Algeria	Macao (China)
Argentina	Malaysia
Brazil	Malta
B-S-J-G (China)*	Moldova
Bulgaria	Montenegro
Colombia	Peru
Costa Rica	Qatar
Croatia	Romania
Cyprus <sup>1</sup>	Russian Federation
Dominican Republic	Singapore
Former Yugoslav Republic of Macedonia	Chinese Taipei
Georgia	Thailand
Hong Kong (China)	Trinidad and Tobago
Indonesia	Tunisia
Jordan	United Arab Emirates
Kazakhstan	Uruguay
Kosovo	Viet Nam
Lebanon	

#### Partner countries and economies in previous cycles

Azerbaijan
Himachal Pradesh-India
Kyrgyzstan
Liechtenstein
Mauritius
Miranda-Venezuela
Panama
Serbia
Tamil Nadu-India

\* B-S-J-G (China) refers to the four PISA participating Chinese provinces: Beijing, Shanghai, Jiangsu, Guangdong.

1. Note by Turkey: The information in this document with reference to « Cyprus » relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".

Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

## WHAT DOES THE TEST MEASURE?

In each round of PISA, one of the core domains is tested in detail, taking up nearly two-thirds of the total testing time. The major domain in 2015 was science, as it was in 2006. Reading was the major domain in 2000 and 2009, and mathematics was the major domain in 2003 and 2012. With this alternating schedule of major domains, a thorough analysis of achievement in each of the three core areas is presented every nine years; an analysis of trends is offered every three years.



The *PISA 2015 Assessment and Analytical Framework* (OECD, 2017a) presents definitions and more detailed descriptions of the domains assessed in PISA 2015:

- **Science literacy** is defined as the ability to engage with science-related issues, and with the ideas of science, as a reflective citizen. A scientifically literate person is willing to engage in reasoned discourse about science and technology, which requires the competencies to explain phenomena scientifically, evaluate and design scientific enquiry, and interpret data and evidence scientifically.
- **Reading literacy** is defined as students' ability to understand, use, reflect on and engage with written texts in order to achieve one's goals, develop one's knowledge and potential, and participate in society.
- **Mathematical literacy** is defined as students' capacity to formulate, employ and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematical concepts, procedures, facts and tools to describe, explain and predict phenomena. It assists individuals in recognising the role that mathematics plays in the world and to make the well-founded judgements and decisions needed by constructive, engaged and reflective citizens.
- **Financial literacy** is defined as the knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply such knowledge and understanding in order to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life.
- **Collaborative problem-solving literacy** is defined as the capacity of an individual to effectively engage in a process whereby two or more agents attempt to solve a problem by sharing the understanding and effort required to come to a solution and pooling their knowledge, skills and efforts to reach that solution.

#### Box B. Key features of PISA 2015

##### The content

- The PISA 2015 survey focused on science, with reading, mathematics and collaborative problem solving as minor areas of assessment. PISA 2015 also included an assessment of young people's financial literacy, which was optional for countries and economies.

##### The students

- Approximately 540 000 students completed the assessment in 2015, representing about 29 million 15-year-olds in the schools of the 72 participating countries and economies.

##### The assessment

- Computer-based tests were used, with assessments lasting a total of two hours for each student.
- Test items were a mixture of multiple-choice questions and questions requiring students to construct their own responses. The items were organised in groups based on a passage setting out a real-life situation. About 810 minutes of test items for science, reading, mathematics and collaborative problem solving were created, with different students taking different combinations of test items.
- Students also answered a background questionnaire, which took 35 minutes to complete. The questionnaire sought information about the students themselves, their homes, and their school and learning experiences. School principals completed a questionnaire that covered the school system and the learning environment. For additional information, some countries/economies decided to distribute a questionnaire to teachers. It was the first time that this optional teacher questionnaire was offered to PISA-participating countries/economies. In some countries/economies, optional questionnaires were distributed to parents, who were asked to provide information on their perceptions of and involvement in their child's school, their support for learning in the home, and their child's career expectations, particularly in science. Countries could choose two other optional questionnaires for students: one asked students about their familiarity with and use of information and communication technologies (ICT); and the second sought information about students' education to date, including any interruptions in their schooling, and whether and how they are preparing for a future career.

## HOW IS THE ASSESSMENT CONDUCTED?

For the first time, PISA 2015 delivered the assessment of all subjects via computer. Paper-based assessments were provided



for countries that chose not to test their students by computer, but the paper-based assessment was limited to questions that could measure trends in science, reading and mathematics performance.<sup>1</sup> New questions were developed for the computer-based assessment only. A field trial was used to study the effect of the change in how the assessment was delivered. Data were collected and analysed to establish equivalence between the computer- and paper-based assessments.

The 2015 computer-based assessment was designed as a two-hour test. Each test form allocated to students comprised four 30-minute clusters of test material. This test design included six clusters from each of the domains of science, reading and mathematics to measure trends. For the major subject of science, an additional six clusters of items were developed to reflect the new features of the 2015 framework. In addition, three clusters of collaborative problem-solving items were developed for the countries that decided to participate in that assessment.<sup>2</sup> There were 66 different test forms. Students spent one hour on the science assessment (one cluster each of trends and new science items) plus one hour on one or two other subjects – reading, mathematics or collaborative problem solving. For the countries/economies that chose not to participate in the collaborative problem-solving assessment, 36 test forms were prepared.

Countries that chose paper-based delivery for the main survey measured student performance with 30 pencil-and-paper forms containing trend items from two of the three core PISA domains.

Each test form was completed by a sufficient number of students, allowing for estimations of proficiency on all items by students in each country/economy and in relevant subgroups within a country/economy (such as boys and girls, and students from different social and economic backgrounds).

The assessment of financial literacy was offered as an option in PISA 2015 based on the same framework as the one developed for PISA 2012.<sup>3</sup> The financial literacy assessment lasted one hour and comprised two clusters distributed to a subsample of students in combination with the science, reading and mathematics assessments.

To gather contextual information, PISA 2015 asked students and the principal of their school to respond to questionnaires. The student questionnaire took about 35 minutes to complete; the questionnaire for principals took about 45 minutes to complete. The responses to the questionnaires were analysed with the assessment results to provide both a broader and more nuanced picture of student, school and system performance. The *PISA 2015 Assessment and Analytical Framework* (OECD, 2017a) presents the questionnaire framework in detail. The questionnaires from all assessments since PISA's inception are available on the PISA website: [www.oecd.org/pisa/](http://www.oecd.org/pisa/).

The questionnaires seek information about:

- students and their family backgrounds, including their economic, social and cultural capital
- aspects of students' lives, such as their attitudes towards learning, their habits and life in and outside of school, and their family environment
- aspects of schools, such as the quality of their human and material resources, public and private management and funding, decision-making processes, staffing practices, and the school's curricular emphasis and extracurricular activities offered
- context of instruction, including institutional structures and types, class size, classroom and school climate, and science activities in class
- aspects of learning, including students' interest, motivation and engagement.

Four additional questionnaires were offered as options:

- **a computer familiarity questionnaire**, focusing on the availability and use of information and communications technology (ICT) and on students' ability to carry out computer tasks and their attitudes towards computer use
- **an educational career questionnaire**, which collects additional information on interruptions in schooling, on preparation for students' future careers, and on support for language learning
- **a parent questionnaire**, focusing on parents' perceptions of and involvement in their child's school, their support for learning at home, school choice, their child's career expectations, and their background (immigrant/non-immigrant)
- **a teacher questionnaire**, new to PISA in 2015, that will help establish the context for students' test results. Additionally, a parallel questionnaire in this cycle asked science teachers to describe their teaching practices, focusing on teacher-directed teaching and learning activities in science lessons, and on a selected set of enquiry-based activities. The teacher questionnaire given to science teachers also asked about the content of the school's science curriculum and how it is communicated to parents.



The contextual information collected through the student, school and optional questionnaires is complemented by system-level data. Indicators describing the general structure of education systems, such as expenditure on education, stratification, assessments and examinations, appraisals of teachers and school leaders, instruction time, teachers' salaries, actual teaching time and teacher training are routinely developed and produced by the OECD (e.g. in the annual OECD publication, *Education at a Glance*). These data are extracted from *Education at a Glance 2016* (OECD, 2016), *Education at a Glance 2015* (OECD, 2015) and *Education at a Glance 2014* (OECD, 2014) for the countries that participate in the annual OECD data collection that is administered through the INES Network. For other countries and economies, a special system-level data collection was conducted in collaboration with PISA Governing Board members and National Project Managers.

## WHO ARE THE PISA STUDENTS?

Differences between countries in the nature and extent of pre-primary education and care, in the age of entry into formal schooling, in the structure of the education system, and in the prevalence of grade repetition mean that school grade levels are often not good indicators of where students are in their cognitive development. To better compare student performance internationally, PISA targets students of a specific age. PISA students are aged between 15 years 3 months and 16 years 2 months at the time of the assessment, and have completed at least 6 years of formal schooling. They can be enrolled in any type of institution, participate in full-time or part-time education, in academic or vocational programmes, and attend public or private schools or foreign schools within the country. (For an operational definition of this target population, see Annex A2.) Using this age across countries and over time allows PISA to compare consistently the knowledge and skills of individuals born in the same year who are still in school at age 15, despite the diversity of their education histories in and outside of school.

The population of PISA-participating students is defined by strict technical standards, as are the students who are excluded from participating (see Annex A2). 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 2 standard errors of sampling. Exclusion could take place either through the schools that participated or the students who participated within schools (see Annex A2, Tables A2.1 and A2.2).

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, 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 assessment.

In 30 out of the 72 countries and economies that participated in PISA 2015, the percentage of school-level exclusions amounted to less than 1%; it was 4.1% or less in all countries and economies. 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 29 participating countries and economies, below 5% in 60 participating countries, and below 7% in all countries except the United Kingdom, Luxembourg (both 8.2%) and Canada (7.5%). In 13 out of the 35 OECD countries, the percentage of school-level exclusions amounted to less than 1% and was less than 3% in 30 OECD countries. When student exclusions within schools are also taken into account, there were 7 OECD countries below 2% and 25 OECD countries below 5%. For more detailed information about school and student exclusion from PISA 2015, see Annex A2.

## WHAT KINDS OF RESULTS DOES PISA PROVIDE?

Combined with the information gathered through the tests and the various questionnaires, the PISA assessment provides three main types of outcomes:

- basic indicators that provide a baseline profile of the knowledge and skills of students
- indicators derived from the questionnaires that show how such skills relate to various demographic, social, economic and education variables
- indicators on trends that show changes in outcomes and distributions, and in relationships between student-level, school-level, and system-level background variables and outcomes over time.



## WHERE CAN YOU FIND THE RESULTS?

This is the last of five volumes that present the results from PISA 2015. It describes and contextualises the results of the 2015 collaborative problem-solving assessment. The volume begins by explaining how PISA assessed collaborative problem solving. It then provides an international comparison of student performance in collaborative problem solving and examines how various demographic factors are related to performance. Attitudes towards collaboration are then covered, followed by an analysis of student activities and school practices that are related to performance in and attitudes towards collaboration. The volume concludes with a discussion of whether collaborative environments at school, at home, and within the community are related to skills in and attitudes towards collaboration.

The other four volumes cover the following issues:

- *Volume I: Excellence and Equity in Education* provides a detailed examination of student performance in science and describes how performance has changed over previous PISA assessments. It also explores students' engagement with and attitudes towards science, including their expectations of working in a science-related career later on. An overview of student performance in reading and mathematics in 2015 is also provided, along with a description of how performance in those subjects has evolved over previous PISA assessments. The volume defines and discusses equity in education, focusing particularly on how socio-economic status and an immigrant background are related to students' performance in PISA and to their attitudes towards science.
- *Volume II: Policies and Practices for Successful Schools* examines how student performance is associated with various characteristics of individual schools and concerned school systems. The volume first focuses on science, describing the school resources devoted to science and how science is taught in schools. It discusses how both of these are related to student performance in science, students' epistemic beliefs, and students' expectations of pursuing a career in science. Then, the volume analyses schools and school systems and their relationship with education outcomes more generally, covering the learning environment in school, school governance, the selection and grouping of students, and the human, financial, educational and time resources allocated to education. Trends in these indicators between 2006 and 2015 are examined when comparable data are available.
- *Volume III: Students' Well-Being* describes how well adolescent students are learning and living. This volume analyses a broad set of indicators that, collectively, paint a picture of 15-year-old students' home and school environments, the way students communicate with family and friends, how and how often they use the Internet, their physical activities and eating habits, their aspirations for future education, their motivation for school work, and their overall satisfaction with life.
- *Volume IV: Students' Financial Literacy* examines 15-year-old students' understanding about money matters in the 15 countries and economies that participated in this optional assessment. The volume explores how the financial literacy of 15-year-old students is associated with their competencies in science, reading and mathematics, with their socio-economic status, and with their previous experiences with money. The volume also offers an overview of financial education in schools in the participating countries and economies, and provides case studies.

Volumes I and II were published in December 2016. Volume III was published in April 2017 and Volume IV was published in May 2017.

The frameworks for assessing science, reading, mathematics, financial literacy and collaborative problem solving in 2015 are described in the *PISA 2015 Assessment and Analytical Framework* (OECD, 2017a).

Technical annexes at the end of this volume describe how questionnaire indices were constructed, and discuss sampling issues, quality-assurance procedures, the reliability of coding, and the process followed for developing the assessment instruments. Many of the issues covered in the technical annexes are elaborated in greater detail in the *PISA 2015 Technical Report* (OECD, 2017b).

A selection of data tables referred to in the analyses is included at the end of the respective volume in Annex B1, and a set of additional data tables is available on line ([www.oecd.org/pisa/](http://www.oecd.org/pisa/)). A Reader's Guide is also provided in each volume to aid in interpreting the tables and figures that accompany the report. Data from regions within the participating countries are included in Annex B2.

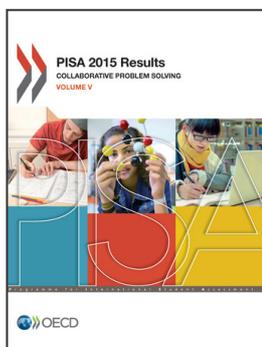


## Notes

1. The paper-based form was used in 15 countries/economies including Albania, Algeria, Argentina, the former Yugoslav Republic of Macedonia, Georgia, Indonesia, Jordan, Kazakhstan, Kosovo, Lebanon, Malta, Moldova, Romania, Trinidad and Tobago, and Viet Nam, as well as in Puerto Rico, an unincorporated territory of the United States.
2. The collaborative problem-solving assessment was not conducted in the countries/economies that delivered the PISA 2015 assessment on paper, nor was it conducted in the Dominican Republic, Ireland, Poland, Qatar and Switzerland.
3. The financial literacy assessment was conducted in Australia, Belgium (Flemish Community only), Beijing, Shanghai, Jiangsu, Guangdong (China), Brazil, seven Canadian provinces, Chile, Italy, Lithuania, the Netherlands, Peru, Poland, the Russian Federation, the Slovak Republic, Spain and the United States.

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