



Programme for International Student Assessment

Assessing Scientific, Reading and Mathematical Literacy

A Framework for PISA 2006

OECD

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT



Foreword

The OECD Programme for International Student Assessment (PISA), created in 1997, represents a commitment by the governments of OECD member countries to monitor the outcomes of education systems in terms of student achievement, within a common international framework. PISA is, above all, a collaborative effort, bringing together scientific expertise from the participating countries and steered jointly by their governments on the basis of shared, policy-driven interests. Participating countries take responsibility for the project at the policy level. Experts from participating countries also serve on working groups that are charged with linking the PISA policy objectives with the best available substantive and technical expertise in the field of internationally comparative assessment. Through participating in these expert groups, countries ensure that the PISA assessment instruments are internationally valid and take into account the cultural and curricular context of OECD member countries, have strong measurement properties, and place an emphasis on authenticity and educational validity.

PISA 2006 represents a continuation of the data strategy adopted in 1997 by OECD countries. The assessed domains continue to be the same as in 2000 and 2003, however *scientific literacy* is now the major domain and the assessment was carried out using a revised framework. The framework for *reading literacy* remains parallel to the ones used in the 2000 and 2003 assessments and the framework for *mathematical literacy* remains parallel to the ones used in the 2003 assessment and they are respectively presented in the publications *Measuring Student Knowledge and Skills – A New Framework for Assessment* (OECD, 1999) and *The PISA 2003 Assessment Framework – Mathematics, Reading, Science and Problem Solving Knowledge and Skills* (OECD, 2003a).

In a similar way, this new publication presents the guiding principle of the PISA 2006 assessment, which is described in terms of the content that students need to acquire, the processes that need to be performed and the contexts in which knowledge and skills are applied. Further, it illustrates the assessment domains with a range of sample tasks. These have been developed by expert panels under the direction of Raymond Adams, Ross Turner, Barry McCrae and Juliette Mendelovits from the Australian Council for Educational Research (ACER). The science expert group was chaired by Rodger Bybee of the Biological Science Curriculum Study from the United States. The mathematics expert group panel was chaired by Jan de Lange of the University of Utrecht from the Netherlands and the reading expert group was chaired by Irwin Kirsch of Educational Testing Service in the United States until October 2005. After this time John de Jong of the Language Testing Services from the Netherlands became acting chair. The members of the expert groups are listed at the end of this publication. The frameworks have also been reviewed by expert panels in each of the participating countries.

This publication was prepared by the OECD Secretariat, principally by John Cresswell and Sophie Vayssettes. The report is published on the responsibility of the Secretary-General of the OECD.



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Introduction

OVERVIEW

The OECD Programme for International Student Assessment (PISA) is a collaborative effort undertaken by all member countries and a number of non-member partner countries to measure how well students, at age 15, are prepared to meet the challenges they may encounter in future life. Age 15 is chosen because at this age, in most OECD countries, students are approaching the end of compulsory schooling, and so, some measure of the knowledge, skills and attitudes accumulated over approximately ten years of education is gained from an assessment at this time. The PISA assessment takes a broad approach to assessing knowledge, skills and attitudes that reflect current changes in curricula, moving beyond the school based approach towards the use of knowledge in everyday tasks and challenges. The skills acquired reflect the ability of students to continue learning throughout their lives by applying what they learn in school to non-school environments, evaluating their choices and making decisions. The assessment, jointly guided by the participating governments, brings together the policy interests of countries by applying scientific expertise at both national and international levels.

PISA combines the assessment of domain-specific cognitive areas such as science, mathematics and reading with information on students' home background, their approaches to learning, their perceptions of their learning environments and their familiarity with computers. A high priority in PISA 2006 is an innovative assessment of student attitudes towards science – questions about this were contextualised within the cognitive part of the test. Bringing the attitude items closer to the cognitive questions allowed questions to be targeted at specific areas, with the focus on interest in science and students' support for scientific enquiry. Student outcomes are then associated with these background factors.

PISA uses: *i)* strong quality assurance mechanisms for translation, sampling and test administration; *ii)* measures to achieve cultural and linguistic breadth in the assessment materials, particularly through countries' participation in the development and revision processes for the production of the items; and *iii)* state of the art technology and methodology for data handling. The combination of these measures produces high quality instruments and outcomes with superior levels of validity and reliability to improve the understanding of education systems as well as students' knowledge, skills and attitudes.

PISA is based on a dynamic model of lifelong learning in which new knowledge and skills necessary for successful adaptation to a changing world are continuously acquired throughout life. PISA focuses on things that 15-year-old students will need in the future and seeks to assess what they can do with what they have learned. The assessment is informed, but not constrained, by the common denominator of national curricula. Thus, while it does assess students' knowledge, PISA also examines their ability to reflect, and to apply their knowledge and experience to real world issues. For example, in order to understand and evaluate scientific advice on food safety an adult would need not only to know some basic facts about the composition of nutrients, but also to be able to apply that information. The term "literacy" is used to encapsulate this broader concept of knowledge and skills.



Box A • What is PISA?

Basics

- An internationally standardised assessment that was jointly developed by participating countries and administered to 15-year-olds in educational programmes.
- A survey implemented in 43 countries in the first cycle (32 in 2000 and 11 in 2002), 41 countries in the second cycle (2003) and 56 in the third cycle (2006).
- The test is typically administered to between 4 500 and 10 000 students in each country.

Content

- PISA 2006 covers the domains of *reading*, *mathematical* and *scientific literacy* not so much in terms of mastery of the school curriculum, but in terms of important knowledge and skills needed in adult life.
- Emphasis is on the mastery of processes, the understanding of concepts and the ability to function in various situations within each domain.

Methods

- Paper-and-pencil tests are used, with assessments lasting a total of two hours for each student.
- Test items are a mixture of multiple-choice items and questions requiring students to construct their own responses. The items are organised in groups based on a passage setting out a real-life situation.
- A total of about 390 minutes of test items is covered, with different students taking different combinations of test items.
- Students answer a background questionnaire, which takes 30 minutes to complete, providing information about themselves and their homes. School principals are given a 20-minute questionnaire about their schools.

Assessment cycle

- The assessment takes place every three years with a strategic plan in place extending through to 2015.
- Each of these cycles looks in depth at a major domain, to which two-thirds of testing time is devoted; the other domains provide a summary profile of skills. Major domains are *reading literacy* in 2000, *mathematical literacy* in 2003 and *scientific literacy* in 2006.

Outcomes

- A basic profile of knowledge and skills among 15-year-old students
- Contextual indicators relating results to student and school characteristics, with emphasis in 2006 placed on assessing students' attitudes towards science
- Trend indicators showing how results change over time
- A valuable knowledge base for policy analysis and research



PISA is designed to collect information through three-yearly cycles and presents data on the *reading*, *mathematical* and *scientific literacy* of students, schools and countries. It provides insights into the factors that influence the development of skills and attitudes at home and at school, and examines how these factors interact and what the implications are for policy development.

This publication presents the conceptual framework underlying the PISA 2006 assessments, including a re-developed and expanded framework for *scientific literacy*, incorporating an innovative component on the assessment of students' attitudes towards science, and the frameworks for the assessment of reading and mathematics. Within each domain, the framework defines the contents that students need to acquire, the processes that need to be performed and the contexts in which knowledge and skills are applied. Finally, it illustrates the domain and their aspects with sample tasks.

BASIC FEATURES OF PISA 2006

PISA 2006 is the third cycle of a data strategy defined in 1997 by participating countries. The publications *Measuring Student Knowledge and Skills – A New Framework for Assessment* (OECD, 1999) and *The PISA 2003 Assessment Framework – Mathematics, Reading, Science and Problem Solving Knowledge and Skills* (OECD, 2003a) presented the conceptual framework underlying the first two cycles of PISA. The results from those cycles were presented in the publications *Knowledge and Skills for Life – First Results from PISA 2000* (OECD, 2001) and *Learning for Tomorrow's World: First Results from PISA 2003* (OECD, 2004), and are also available on the PISA website: www.pisa.oecd.org. The results allow national policy makers to compare the performance of their education systems with those of other countries. Similar to the previous cycles, the 2006 assessment covers the domains of *reading*, *mathematical* and *scientific literacy*, with the major focus on *scientific literacy*. Students also respond to a background questionnaire, and additional supporting information is gathered from the school authorities. Fifty-six countries and regions, including all 30 OECD member countries, are taking part in the PISA 2006 assessment. Together, they comprise almost 90% of the world's economy.

Since the aim of PISA is to assess the cumulative yield of education systems at an age where compulsory schooling is still largely universal, testing focused on 15-year-olds enrolled in both school-based and work-based educational programmes. Between 5 000 and 10 000 students from at least 150 schools will typically be tested in each country, providing a good sampling base from which to break down the results according to a range of student characteristics.

The primary aim of the PISA assessment is to determine the extent to which young people have acquired the wider knowledge and skills in *reading*, *mathematical* and *scientific literacy* that they will need in adult life. The assessment of cross-curricular competencies continues to be an integral part of PISA 2006. The main reasons for this broadly oriented approach are:

- Although specific knowledge acquisition is important in school learning, the application of that knowledge in adult life depends crucially on the acquisition of broader concepts and skills. In science, having specific knowledge, such as the names of plants and animals, is of less value than understanding broad topics such as energy consumption, biodiversity and human health in thinking about the issues under debate in the adult community. In reading, the capacity to develop interpretations of written material and to reflect on the content and qualities of text are central skills. In mathematics, being able to reason quantitatively and to represent relationships or



dependencies is more apt than the ability to answer familiar textbook questions when it comes to deploying mathematical skills in everyday life.

- In an international setting, a focus on curriculum content would restrict attention to curriculum elements common to all or most countries. This would force many compromises and result in an assessment too narrow to be of value for governments wishing to learn about the strengths and innovations in the education systems of other countries.
- Certain broad, general skills are essential for students to develop. They include communication, adaptability, flexibility, problem solving and the use of information technologies. These skills are developed across the curriculum and an assessment of them requires a broad cross-curricular focus.

PISA is not a single cross-national assessment of the reading, mathematics and science skills of 15-year-old students. It is an ongoing programme that, over the longer term, will lead to the development of a body of information for monitoring trends in the knowledge and skills of students in various countries as well as in different demographic subgroups of each country. On each occasion, one domain will be tested in detail, taking up nearly two-thirds of the total testing time. The major domain was *reading literacy* in 2000 and *mathematical literacy* in 2003, and is *scientific literacy* in 2006. This will provide a thorough analysis of achievement in each area every nine years and a trend analysis every three.

Similar to previous cycles of PISA, the total time spent on the PISA 2006 tests by each student is two hours, but information is obtained on about 390 minutes worth of test items. The total set of questions is packaged into 13 linked testing booklets. Each booklet is taken by a sufficient number of students for appropriate estimates to be made of the achievement levels on all items by students in each country and in relevant sub-groups within a country (such as males and females, and students from different social and economic contexts). Students also spend 30 minutes answering questions for the context questionnaire.

The PISA assessment provides three main types of outcomes:

- Basic indicators that provide baseline profile of the knowledge and skills of students.
- Contextual indicators that show how such skills relate to important demographic, social, economic and educational variables.
- Indicators on trends that emerge from the on-going nature of the data collection and that show changes in outcome levels and distributions, and in relationships between student-level and school-level background variables and outcomes.

Although indicators are an adequate means of drawing attention to important issues, they are not usually capable of providing answers to policy questions. PISA has therefore also developed a policy-oriented analysis plan that will go beyond the reporting of indicators.

WHAT MAKES PISA UNIQUE

PISA is not the first international comparative survey of student achievement. Others have been conducted over the past 40 years, primarily developed by the International Association for the Evaluation of Educational Achievement (IEA) and by the Education Testing Service's International Assessment of Educational Progress (IAEP).



More importantly, these surveys have concentrated on outcomes linked directly to the curriculum and then only to those parts of the curriculum that are essentially common across the participating countries. Aspects of the curriculum unique to one country or a small number of countries have usually not been taken into account in the assessments.

PISA takes a different approach in a number of respects:

- Its *origin*: an initiative taken by governments, whose policy interests the results are addressing.
- Its *regularity*: the commitment to cover multiple assessment domains with updates every three years makes it possible for countries to monitor regularly and predictably their progress in meeting key learning objectives.
- The *age-group covered*: assessing young people near the end of their compulsory schooling gives a useful indication of the performance of education systems. While most young people in OECD countries continue their initial education beyond the age of 15, this is normally close to the end of the initial period of basic schooling in which all young people follow a broadly common curriculum. It is useful to determine, at that stage, the extent to which they have acquired knowledge and skills that will help them in the future, including the individualised paths of further learning they may follow.
- The *knowledge and skills tested*: these are defined not primarily in terms of a common denominator of national school curricula but in terms of what skills are deemed to be essential for future life. This is the most fundamental feature of PISA. School curricula are traditionally constructed largely in terms of bodies of information and techniques to be mastered. They traditionally focus less, within curriculum areas, on the skills to be developed in each domain for use generally in adult life. They focus even less on more general competencies, developed across the curriculum, to solve problems and apply ideas and understanding to situations encountered in life. PISA does not exclude curriculum-based knowledge and understanding, but it tests for it mainly in terms of the acquisition of broad concepts and skills that allow knowledge to be applied. Further, PISA is not constrained by the common denominator of what has been specifically taught in the schools of participating countries.

This emphasis on testing in terms of mastery and broad concepts is particularly significant in light of the concern among nations to develop human capital, which the OECD defines as:

The knowledge, skills, competencies and other attributes embodied in individuals that are relevant to personal, social and economic well-being.

Estimates of human capital have tended, at best, to be derived using proxies such as level of education completed. When the interest in human capital is extended to include attributes that permit full social and democratic participation in adult life and that equip people to become lifelong learners, the inadequacy of these proxies becomes even clearer.

By directly testing for knowledge and skills close to the end of basic schooling, PISA examines the degree of preparedness of young people for adult life and, to some extent, the effectiveness of education systems. Its ambition is to assess achievement in relation to the underlying objectives (as defined by society) of education systems, not in relation to the teaching and learning of a body of knowledge. This view of educational outcomes is needed if schools and education systems are to be encouraged to focus on modern challenges.



AN OVERVIEW OF WHAT IS BEING ASSESSED IN EACH DOMAIN

Box B presents a definition of the three domains assessed in PISA 2006. The definitions all emphasise functional knowledge and skills that allow one to participate actively in society. Such participation requires more than just being able to carry out tasks imposed externally by, for example, an employer. It also means being equipped to take part in decision-making processes. In the more complex tasks in PISA, students were asked to reflect on and evaluate material, not just to answer questions that have single correct answers.

Box B • Definitions of the domains

Scientific literacy: An individual's scientific knowledge and use of that knowledge to identify questions, to acquire new knowledge, to explain scientific phenomena, and to draw evidence-based conclusions about science-related issues, understanding of the characteristic features of science as a form of human knowledge and enquiry, awareness of how science and technology shape our material, intellectual, and cultural environments, and willingness to engage in science-related issues, and with the ideas of science, as a reflective citizen.

Reading literacy: An individual's capacity to understand, use and reflect on written texts, in order to achieve one's goals, to develop one's knowledge and potential and to participate in society.

Mathematical literacy: An individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgements and to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen.

Scientific literacy (elaborated in Chapter 1) is defined as the ability to use scientific knowledge and processes not only to understand the natural world but to participate in decisions that affect it. *Scientific literacy* is assessed in relation to:

- *Scientific knowledge or concepts:* These constitute the links that aid understanding of related phenomena. In PISA, while the concepts are the familiar ones relating to physics, chemistry, biological sciences and earth and space sciences, they are applied to the content of the items and not just recalled.
- *Scientific processes:* These are centred on the ability to acquire, interpret and act upon evidence. Three such processes present in PISA relate to: *i*) describing, explaining and predicting scientific phenomena, *ii*) understanding scientific investigation, and *iii*) interpreting scientific evidence and conclusions.
- *Situations or contexts:* These concern the application of scientific knowledge and the use of scientific processes. The framework identifies three main areas: science in life and health, science in Earth and environment, and science in technology.

Reading literacy (elaborated in Chapter 2) is defined in terms of students' ability to understand, use and reflect on written text to achieve their purposes. This aspect of literacy has been well established by previous surveys such as the International Adult Literacy Survey (IALS), but is taken further in PISA by the introduction of an active element – the capacity not just to understand



a text but to reflect on it, drawing on one's own thoughts and experiences. *Reading literacy* is assessed in relation to the:

- *Text format*: Often students' reading assessments have focused on *continuous texts* or prose organised in sentences and paragraphs. PISA introduces in addition *non-continuous texts* that present information in other ways, such as in lists, forms, graphs, or diagrams. It will also distinguish between a range of prose forms, such as narration, exposition and argumentation. These distinctions are based on the principle that individuals will encounter a range of written material in their work-related adult life (e.g. application, forms, advertisements) and that it is not sufficient to be able to read a limited number of types of text typically encountered in school.
- *Reading processes (aspects)*: Students are not assessed on the most basic reading skills, as it is assumed that most 15-year-old students will have acquired these. Rather, they are expected to demonstrate their proficiency in retrieving information, forming a broad general understanding of the text, interpreting it, reflecting on its contents and reflecting on its form and features.
- *Situations*: These are defined by the use for which the text was constructed. For example, a novel, personal letter or biography is written for people's personal use; official documents or announcements for public use; a manual or report for occupational use; and a textbook or worksheet for educational use. Since some groups may perform better in one reading situation than in another, it is desirable to include a range of types of reading in the assessment items.

Mathematical literacy (elaborated in Chapter 3) is concerned with the ability of students to analyse, reason, and communicate ideas effectively as they pose, formulate, solve, and interpret solutions to mathematical problems in a variety of situations. *Mathematical literacy* is assessed in relation to the:

- *Mathematical content*: This is defined mainly in terms of four overarching ideas (*quantity, space and shape, change and relationships, and uncertainty*) and only secondarily in relation to curricular strands such as numbers, algebra and geometry.
- *Mathematical processes*: These are defined by general mathematical competencies. These include the use of mathematical language, modelling and problem-solving skills. Such skills, however, are not separated out in different test items, since it is assumed that a range of competencies will be needed to perform any given mathematical task. Rather, questions are organised in terms of competency clusters defining the type of thinking skill needed.
- *Situations*: These are defined in terms of the ones in which mathematics is used, based on their distance from the students. The framework identifies five situations: personal, educational, occupational, public and scientific.

ASSESSING AND REPORTING PISA 2006

Similar to the previous assessments in PISA, the assessment in 2006 consists of pencil and paper instruments for reasons of feasibility. The assessment includes a variety of types of questions. Some require students to select or produce simple responses that can be directly compared with a single correct answer, such as multiple-choice or closed-constructed response items. These questions have either a correct or incorrect answer and often assess lower-order skills. Others are more constructive, requiring students to develop their own responses designed to measure broader constructs than those captured by more traditional surveys, allowing for a wider range of acceptable responses and more complex marking that can include partially correct responses.



Not all students answer all questions in the assessment. The PISA 2006 test units are arranged in 13 clusters, with each cluster designed to occupy 30 minutes of testing time. There are seven science clusters, two reading clusters and four mathematics clusters. The clusters are placed in 13 booklets, according to a rotated test design. Each booklet contains four clusters and each student is assigned one of these two-hour booklets. There is at least one science cluster in each booklet.

Literacy in PISA is assessed through units consisting of a stimulus (*e.g.* text, table, chart, figures etc.) followed by a number of tasks associated with this common stimulus. This is an important feature, allowing questions to go into greater depth than they could if each question introduced a wholly new context. It allows time for the student to digest material that can then be used to assess multiple aspects of performance.

Results from PISA have been reported using scales with an average score of 500 and a standard deviation of 100 for all three domains, which means that two-thirds of students across OECD countries scored between 400 and 600 points. These scores represent degrees of proficiency in a particular aspect of literacy. As *reading literacy* was the major domain in 2000, the reading scales were divided into five levels of knowledge and skills. The main advantage of this approach is that it describes what students can do by associating the tasks with levels of difficulty. Additionally, results were also presented through three subscales of reading: retrieving information, interpreting texts, and reflection and evaluation. A proficiency scale was also available for *mathematical* and *scientific literacy*, though without levels thus recognising the limitation of the data from minor domains. PISA 2003 built upon this approach by specifying six proficiency levels for the mathematical literacy scale, following a similar approach to what was done in reading. There were four subscales in *mathematical literacy*: *space and shape*, *change and relationships*, *quantity* and *uncertainty*. The reporting of *scientific literacy* will be in a similar manner and will also present results in different areas. PISA 2003 offered the first opportunity to present trend results for *reading*, *mathematical* and *scientific literacy* and the results from PISA 2006 will provide extra information for this analysis.

THE CONTEXT QUESTIONNAIRES AND THEIR USE

To gather contextual information, PISA asks students and the principals of their schools to respond to background questionnaires of around 30 minutes in length. These questionnaires are central to the analysis of results in terms of a range of student and school characteristics. The questionnaires from PISA 2000 and 2003 are available on the PISA website: www.pisa.oecd.org.

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 inside school, and their family environment
- Aspects of schools, such as the quality of the schools' human and material resources, public and private control and funding, decision-making processes, and staffing practices
- Context of instruction, including institutional structures and types, class size, and the level of parental involvement



- Strategies of self-regulated learning, motivational preferences and goal orientations, self-related cognition mechanisms, action control strategies, preferences for different types of learning situations, learning styles, and social skills required for co-operative or competitive learning
- Aspects of learning and instruction in science, including students' motivation, engagement and confidence with science, and the impact of learning strategies on achievement related to the teaching and learning of science

Two additional questionnaires are offered as international options:

- A computer familiarity questionnaire focusing on: *i*) availability and use of information and communications technology (ICT), including the location where ICT is mostly used as well as the type of use; *ii*) ICT confidence and attitudes, including self-efficacy and attitudes towards computers; and *iii*) learning background of ICT, focusing on where students learned to use computers and the Internet. The OECD published a report resulting from analysis of data collected via this questionnaire in 2003, *Are Students Ready for a Technology-Rich World? What PISA Studies Tell Us* (OECD, 2005).
- A parent questionnaire focusing on a number of topics including the student's past science activities, parents' views on the student's school, parents' views on science in the student's intended career and the need for scientific knowledge and skills in the job market, parents' views on science and the environment, the cost of education services, and parents' education and occupation.

The contextual information collected through the student and school questionnaires, as well as the optional computer familiarity and parent questionnaires, comprises only a part of the total amount of information available to PISA. Indicators describing the general structure of the education systems (their demographic and economic contexts – for example, costs, enrolments, school and teacher characteristics, and some classroom processes) and their effect on labour market outcomes are already routinely developed and applied by the OECD.

COLLABORATIVE DEVELOPMENT OF PISA AND ITS ASSESSMENT FRAMEWORKS

PISA represents a collaborative effort among the OECD member governments to provide a new kind of assessment of student achievement on a recurring basis. The assessments are developed co-operatively, agreed by participating countries, and implemented by national organisations. The constructive co-operation of students, teachers and principals in participating schools has been crucial to the success of PISA during all stages of the development and implementation.

The PISA Governing Board (PGB), representing all nations at the senior policy levels, determines the policy priorities for PISA in the context of OECD objectives and oversees adherence to these priorities during the implementation of the programme. This includes setting priorities for the development of indicators, for the establishment of the assessment instruments and for the reporting of the results. Experts from participating countries also serve on working groups charged with linking the PISA policy objectives with the best internationally available technical expertise in the different assessment domains. By participating in these expert groups, countries ensure that the instruments are internationally valid and take into account the cultural and educational contexts in OECD member countries. They also ensure that the assessment materials have strong measurement properties and that the instruments emphasise authenticity and educational validity.



Participating countries implement PISA at the national level, through National Project Managers (NPM), subject to the agreed administration procedures. National Project Managers play a vital role in ensuring that implementation is of high quality. They also verify and evaluate the survey results, analyses, reports and publications.

The design and implementation of the present surveys, within the framework established by the PGB, is the responsibility of an international consortium led by the Australian Council for Educational Research (ACER). Other partners in this consortium include the National Institute for Educational Measurement (CITO) in the Netherlands, WESTAT and the Educational Testing Service (ETS) in the United States, and the National Institute for Educational Policy Research (NIER) in Japan.

The OECD Secretariat has overall managerial responsibility for the programme, monitors its implementation on a day-to-day basis, acts as the secretariat for the PGB, builds consensus among countries and serves as the interlocutor between the PGB and the international consortium charged with implementation. The OECD Secretariat is also responsible for the production of the indicators, and the analysis and preparation of the international reports and publications in co-operation with the PISA consortium, in close consultation with member countries both at the policy level (PGB) and at the implementation level (National Project Managers).

The development of the PISA frameworks has been a continuous effort since the programme was created in 1997 and can be described as a sequence:

- Development of a working definition for the assessment domain and description of the assumptions that underlie that definition
- Evaluation of how to organise the tasks constructed in order to report to policy makers and researchers on student achievement in the domain, and identification of key characteristics that should be taken into account when constructing assessment tasks for international use
- Operationalisation of key characteristics used in test construction, with definitions based on existing literature and experience in conducting other large-scale assessments
- Validation of the variables and assessment of the contribution each makes to understanding task difficulty across the various participating countries
- Preparation of an interpretative scheme for the results

While the main benefit of constructing and validating a framework for each of the domains is improved measurement, there are other potential benefits:

- A framework provides a common language and a vehicle for discussing the purpose of the assessment and what it is trying to measure. Such a discussion encourages the development of a consensus around the framework and the measurement goals.
- An analysis of the kinds of knowledge and skills associated with successful performance provides a basis for establishing standards or levels of proficiency. As the understanding of what is being measured and the ability to interpret scores along a particular scale evolve, an empirical basis for communicating a richer body of information to various constituencies can be developed.
- Identifying and understanding particular variables that underlie successful performance further the ability to evaluate what is being measured and to make changes to the assessment over time.



The understanding of what is being measured and its connection to what we say about students provides an important link between public policy, assessment and research which, in turn, enhances the usefulness of the data collected.

