ISA

International Schools' Assessment

***ONLINE** and*
***PAPER** assessments*

- *Mathematical Literacy*
- *Reading*
- *Writing*
- *Scientific Literacy*

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Australian Council *for* Educational Research

ACER

ISA
International Schools' Assessment

What is the ISA?

The ISA is a set of tests used by international schools and schools with an international focus to monitor student performance over time and to confirm that their internal assessments are aligned with international expectations of performance. Designed and developed by the Australian Council for Educational Research (ACER), the ISA mathematical literacy, reading and scientific literacy assessments are based on the Programme for International Student Assessment (PISA). PISA is developed under the auspices of the Organisation for Economic Cooperation and Development (OECD). Note that the ISA is not part of PISA and is not endorsed by the OECD.

What is ACER?

ACER is one of the world's leading educational research centres, committed to creating and promoting research-based knowledge, products and services that can be used to improve learning across the life span. ACER has built a strong reputation as a reliable provider of support and expertise to education policy makers and professional practitioners since it was established in 1930. The development of the ISA is linked to ACER's work on PISA: ACER led a consortium of research and educational institutions as the major contractor to deliver the PISA project on behalf of the OECD from 2000 to 2012.

What is PISA?

PISA is a triennial international survey which aims to evaluate education systems worldwide by testing the skills and knowledge of nationally representative samples of 15-year-old students in key subjects: reading literacy, mathematical literacy and scientific literacy in order to inform national stakeholders about how well their education systems are preparing young people for life after compulsory education. To date, nearly 2 million students representing more than 70 economies have participated in the assessment. In 2012, a total of around 510,000 students in 65 economies participated in the PISA data collection.

Why was the ISA developed?

The idea for the program evolved from two sources: discussions with international school people, and our role in PISA.

In consultation with international schools in the East Asian region, ACER learned about the need for an assessment that would provide them with quantitative and qualitative feedback which could be used for improving learning, as well as for making comparisons with relevant populations. Although many schools were using existing external assessment for monitoring and self-evaluation, there was a general sense that, because these were primarily designed for national use, they did not cater for students from diverse linguistic and cultural backgrounds.

Through managing PISA, ACER has gained invaluable experience in developing assessments that are culturally and educationally appropriate for students from many language and educational backgrounds. These two elements gave ACER confidence that a program like the ISA was needed, and that we were in an ideal position to provide it. The ISA subsequently launched in 2002.

How and when is the ISA delivered?

Mathematical literacy, reading and writing are delivered in paper or online format for students in grades 3 to 10. Scientific literacy is delivered online for students in grades 7 to 10. Schools can administer the tests in either September (paper only), February (paper and/or online) or May (online only).

The ISA is administered by classroom teachers equipped with detailed test administration instructions. The test material is secure. Administrators sign a confidentiality agreement, and must return all student booklets (for the paper ISA), used or unused, to ACER. Assessment material must not be printed or copied. Each assessment session takes 45 minutes to one hour. For the paper ISA, students enter their responses in a single booklet that contains the stimulus and the tasks. ISA online is delivered via a fully web-based service and works on many platforms (Macs, PCs and iPads). Each school has a unique test web address through which each student logs on using a unique username and password.

Why do schools use the ISA?

Because the ISA:

- is not specific to a single curriculum
- tests core skills in mathematical literacy, reading, writing and scientific literacy
- test material is eclectic, drawing on many cultural and national sources
- assessments are designed with the knowledge that more than half of the test takers have first languages other than English
- includes writing tasks and open-ended questions to better illuminate students' thinking processes (like PISA, the ISA is not just a multiple-choice test; half the questions in the reading, mathematical literacy and scientific literacy tests are open questions that require students to construct a response, for example, to explain their reasoning, to find evidence or to justify their opinion)
- provides diagnostic information that can be used at the school, class, or individual level
- enables performance to be related to international benchmarks
- allows schools to evaluate the reliability of their internal assessments and confirm that they are aligned with international expectations of performance
- uses scaled scores enabling monitoring of student performance over time
- enables comparison of the results of their Grade 8, 9 and 10 students with the latest PISA country results
- reports tell parents, teachers and school leaders what they want to know.

What reports are provided?

Report	Broad description	Purpose	Intended audience
Individual	For each individual, student's overall performance in each test in relation to described levels of proficiency	To show the student's **current level of proficiency** and help parents to identify the skills their child has mastered and the skills they still they need to develop. Parents can track their child's progress over time because the ISA scores can be compared from year to year.	Individual students and their parents
Class	For each class, item-by-item and aggregated record of individual students' results	To provide **diagnostic information** about class, sub- group and individual performance on significant clusters of items. Gives teachers detailed information about the kinds of skills their students have mastered and those they still need to learn and shows how their students performed in each question on the test compared to other international schools. Scale scores allow teachers to directly compare students' results at different grade levels and to track performance of students over time.	Class teachers, subject and grade level coordinators
School	For each school, aggregated school data on performance by grade level and subgroup, including comparisons with ISA schools and "like schools": those with a similar percentage of students from English speaking backgrounds.	Allows schools to **benchmark** themselves against other schools internationally. Gives school administrators summary statistics that allow them to monitor their schools' performance over time and to compare their performance at each grade level with other schools that participated in the ISA. Provides the basis for trend analysis and school-level target setting.	Heads, curriculum coordinators, school boards
National Comparisons	For grades 8, 9 & 10, comparison of the school's performance against PISA country data.	Provide a broad picture of school's **performance in** mathematical literacy, reading and scientific literacy in **relation to relevant national groups.**	Heads, curriculum coordinators, school boards
Interactive Diagnostic	For each school, an interactive spreadsheet shows results in a range of graphic displays which makes it easier to identify trends and patterns and to gather diagnostic information.	Provides instant customisation of reports in graphic formats so schools can **interpret and use the ISA data to inform improvements in teaching and learning.**	Class teachers, subject and grade level coordinators, heads, curriculum coordinators
Interactive Tracking	For each school, an interactive spreadsheet shows performance against ISA benchmarks and tracks performance of individual students and cohorts over time.	To **monitor the performance over time** of individual students and of different groups of students within a school. Data from all schools participating in the ISA program have been used to establish reliable benchmarks. Schools can monitor, over a number of calendar years, whether student performance has changed in relation these benchmarks.	Class teachers, subject and grade level coordinators, heads, curriculum coordinators

What are scale scores?

The "ISA scale score" is different to the "raw score" results that you would get by adding up the number of score points for correct answers on each part of the assessment. Each learning area or domain (for example, reading) has a scale and raw scores calibrated onto that scale are converted to scale scores. The ISA scales for mathematical literacy, reading and scientific literacy are based on those developed for the OECD's PISA. However, it is not correct to describe ISA results as 'PISA scores'. The average proficiency of 15-year-old students in OECD countries in mathematical literacy, reading literacy and scientific literacy was set at 500, with a standard deviation of 100, for the year 2000. In 2012 the mean performance in mathematical literacy was 494, in reading it was 496 and in scientific literacy it was 501.

The advantage of using scale scores rather than raw scores or percentage reporting is that the scale makes it possible to compare all students' results within the same domain. For example, using scale scores in reading, we can directly compare the performance of students from Grade 3 to Grade 10 for any year. It does not matter which reading test students completed; their scale scores can be compared with the scale scores of any other students who have completed an ISA reading test in any year. Tracking the ISA scale scores over time can provide quantitative evidence of variations in the abilities of cohorts of students and individuals from one year to the next, as well as evidence of the impact of changes in curriculum or pedagogy on student performance.

The ISA has also developed described proficiency scales based on PISA reporting. ISA reading is reported in terms of ten described levels of achievement across three aspects; ISA levels 3 to 9 are virtually identical with PISA Reading Literacy levels 1b to 6. In ISA mathematical literacy, four content-based scales are described, with ten levels in each scale. Levels 4 to 9 are very slightly modified versions of PISA Mathematical Literacy Levels 1 to 6. In scientific literacy there are seven described proficiency levels (Level 0 to Level 6) organised into three areas of competency. These are generic descriptions of the development of proficiencies based on the results of the test and are closely related to those developed for PISA. In ISA writing there are ten described levels of achievement for narrative/reflective writing, and nine described levels for exposition/argument writing.

How can schools use the ISA data?

Extensive support material is available to help schools to use their ISA data to inform and improve their teaching programs. These include the Guide to Reports, How to use the ISA for Benchmarking and Diagnostic Information and A Guide to Interpreting the ISA Data for School Leaders and Administrators. Annotated writing samples help teachers to understand what is expected at each of the levels of the writing marking guides and can also be used by teachers to moderate their own scoring of writing. If you are still unsure about what your data means you can email us. We pride ourselves on our fast and detailed responses to school queries.

What is the ISA Teaching Resources Centre?

The ISA Teaching Resources Centre provides teachers with access to resources, research-based strategies and lesson plans that can be used to build the knowledge and skills of each individual student in day-to-day classroom practice. Accessible online and always available to ISA participating schools, the ISA Teaching Resources Centre offers educators valuable support for turning ISA results into real, tangible learning outcomes.

How valid are the comparisons?

The ISA online scientific literacy tests were administered to over 5,000 Grade 7 to 10 students in 71 international schools in 2015–16. The ISA paper and online Series N tests of mathematical literacy, reading and writing were administered to over 76,000 students in 355 international schools in 2015–16. In the mathematical literacy, reading and writing assessments, ISA schools are also divided into four "like school" groups on the basis of proportion of students with an English speaking background. We provide comparative data for "like schools", but are careful to do so only when the numbers of students are big enough to yield meaningful comparison. The ISA reports also include a t-test calculation of the significance of the comparisons.

The ISA provides a service to international schools that allows them to compare themselves with other schools internationally. This also relies on the co-operation of the schools. We rely on schools to administer the ISA according to the detailed instructions provided so all students complete the test under the same conditions and the data is comparable. We rely on schools to keep the ISA secure by ensuring that test material is never copied and that all test booklets are returned every year so we can provide scaled scores that link the tests over time. We also rely on schools to only exclude students in a participating grade level from the ISA when they are genuinely unable to attempt the test so the data accurately reflects student achievement in the school. Our contact with ISA schools through email and person-to-person at conferences assures us that the schools currently using the ISA respect and follow these rules. However, the ISA cannot enforce them. It is up to the community of international schools to collectively support the rules and ensure they are followed so the ISA comparative data is maximally useful to everyone.

How is the ISA marked?

Marking is conducted on-screen at ACER's Melbourne office. Markers are required to have a background in the relevant domain: for example, Grade 10 mathematical literacy markers must be secondary school mathematics teachers or equivalent. A marking guide is prepared for each mathematical literacy, reading and scientific literacy constructed-response item and for the two writing tasks. The marking guides describe the criteria needed to gain a given score, and provide examples of student responses typical of each score. Markers receive initial training in the use of the ISA marking guides and follow-up training if necessary throughout the marking operation. The accuracy of the marker is checked against control scripts and team leaders monitor their markers to ensure any issues in the application of the marking guide are discovered, and addressed promptly.

Who is consulted for feedback?

ACER has had ongoing consultations with faculty of many international schools and others involved in international education, through attendance at the ECIS leadership conferences, the East Asia Regional Council of Schools (EARCOS) leadership conferences, the Association of International Schools in Africa (AISA) educators' conferences and the Near East South Asia (NESA) Council of Overseas Schools leadership conferences. ISA project team members take the opportunity wherever possible to make site visits to participating schools, and have been engaged as consultants for extended work in developing and evaluating curriculum and assessment with individual schools.

Specific feedback and consultation on the development of the ISA instruments is conducted via formal trial testing and questionnaires to teachers and administrators during both trial and main administrations.

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Construct and Content Validity

Test Validity

Test validity is an essential characteristic of a good test, but there are different kinds of validity, two of which are discussed below: construct validity and content validity.

Construct Validity

> **Do the definitions of the variable that is being tested and the way it is broken down into various categories and attributes match a common understanding of what the variable is?**

The mathematical literacy, reading and scientific literacy components of the ISA are based on the constructs used for PISA. The definition and frameworks for the PISA domains of mathematical literacy, reading and scientific literacy were created by panels of international experts in the field, so there is strong international academic endorsement, by extension, for the concepts of mathematics, reading and science that are instantiated in the ISA.

The writing component of the ISA is based on historical development at ACER over several decades, of the concept of writing and the way students develop as writers. The marking and reporting scheme is very similar in nature to that used in the International Baccalaureate Middle Years Programme, and the AERO standards for writing – to name two international educational reference points – as well as to national examples of writing frameworks such as the McRel Standards, the Alberta writing program, and the Six Traits (with the exception of Voice).

Mathematical Literacy

The ISA adopts the PISA definition that "Mathematical literacy is an individual's 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 to recognise the role that mathematics plays in the world and to make the well-founded judgments and decisions needed by constructive, engaged and reflective citizens'.

In practice, mathematical literacy in the ISA is somewhat different from conventional mathematics, in that it is intended to encompass reasoning mathematically and using mathematical concepts, procedures, facts and tools in describing, predicting and explaining phenomena. Each task in the mathematical literacy assessment is defined according to its *content* and the main type of *process* needed to complete it successfully.

Content Variables

Uncertainty and Data – This content area reflects how in real life data is commonly collected, organised, analysed and displayed with a view to making interpretations and forming conclusions. Many decisions are made based upon statistical analysis of data. Real life also contains elements of chance where outcomes are not certain but based upon probabilities. Increasingly decision-making is qualified with a statement of risk and society is presented with more and more information to make sense of, so competence in this area is of great significance in real life.

Quantity – This overarching content area also features in the three other content areas to varying degrees. It focuses on the need for quantification in order to organise the world. It is not hard to find examples of quantification in our day-to-day living. We use money, make measurements, estimate and calculate. Increasingly we make use of technology to assist us but we also still per- form many calculations mentally and approximately. Quantitative reasoning requires number sense: that is, having a feel for the magnitude of numbers, using strategies and tools appropriately, and being able to check solutions for reasonableness.

Space and Shape – Shapes and constructions are all around us physically as real objects but also as representations in the form of photographs, maps and diagrams. Constructing and interpreting such representations is an important skill. Using geometric shapes whose mathematical properties are known to model more complex shapes is an important problem-solving tool. Knowledge and appreciation of the beauty and function of geometric shapes and spaces has applications reaching from art to advertising.

Change and Relationships – Noticing and using patterns in number and shapes, and finding and describing relationships between variables, lies at the heart of mathematics. As organisms or populations grow and as stock markets ebb and flow, we describe the patterns in words, in tables and sometimes in algebraic notation. Commonly we chart the changes in graphical form. These pat- terns can be linear, non-linear, cyclic or exponential, to name but a few. Being able to link between these various representations and use the language, notation and algorithms of change and relationships is critical to making sense of the patterns in our world.

Process Variables

Formulating mathematics involves identifying opportunities to apply and use mathematics. It includes being able to take a situation as presented and transform it into a form amenable to mathematical treatment, providing mathematical structure and representations, identifying variables and making simplifying assumptions to help solve the problem or meet the challenge.

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Employing mathematics involves applying mathematical reasoning and using mathematical concepts, procedures, facts and tools to derive a mathematical solution. It includes performing calculations, manipulating algebraic expressions and equations or other mathematical models, analysing information in a mathematical manner from mathematical diagrams and graphs, developing mathematical descriptions and explanations and using mathematical tools to solve problems.

Interpreting mathematics involves reflecting upon mathematical solutions or results and interpreting them in the context of a problem or challenge. It includes evaluating mathematical solutions or reasoning in relation to the context of the problem and determining whether the results are reasonable and make sense in the situation.

Reading

Reading in the ISA is derived from the PISA concept of reading literacy, which was developed by an international panel of reading experts. Reading literacy in PISA is defined as 'understanding, using and reflecting on written texts, in order to achieve one's goals, to develop one's knowledge and potential and to participate in society.' While this definition and the construct of reading that grew out of it were developed with 15-year-olds in mind, the ISA construct of reading maintains the general thrust of a reading assessment that goes beyond the notion of decoding and literal comprehension (though at the lowest levels these are included), and recognises the full scope of situations in which reading plays a role for students from grade 3 to grade 10.

Each reading task in the ISA is defined in terms of the *aspect* or approach to reading that it requires, and according to the *Text Format* of the reading passage on which the task is based.

Aspect Variables

Access and Retrieve is defined as locating one or more pieces of information in a text.

Integrate and Interpret is defined as constructing meaning and drawing inferences from one or more parts of a text.

Reflect and Evaluate is defined as relating a text to one's experience, knowledge and ideas.

Text Format Variables

Continuous Texts are typically composed of sentences that are, in turn, organised into paragraphs. These may fit into even larger structures such as sections, chapters and books. Continuous texts include narrative pieces, exposition, description, argument and instructional passages.

Non-Continuous Texts, or documents as they are known in some frameworks, can be described in structural terms as texts composed of one or more lists. In less formal terms, they can be described by their everyday appearance in such formats as tables, graphs, maps and diagrams.

Writing

The ISA includes two extended writing tasks: one narrative/reflective task and one exposition/argument task.

For the *Narrative/Reflective* task the students are asked to write a story or a reflective piece. The stimulus is usually a picture. The same prompt is used for all grades.

The *Exposition/Argument* task requires a piece of writing setting out ideas about a proposition. A few sentences or a short dialogue are provided as a prompt. Students may take an explanatory approach (exposition), a persuasive approach (argument), or they may combine the two approaches. The same prompt is used for all grades.

In an effort to simulate good writing pedagogy, time is allowed at the beginning of each writing session for a brief class discussion of the topic, and for individual planning. Time is also allowed at the end of each session for students to proofread their work. Students' responses are evaluated on the basis of three criteria for each task.

Criteria for Assessing the Narrative/Reflective Task

Content is about the quality and range of ideas presented, the development of plot, characters and setting if a story is written, and the writer's sense of audience and purpose. It also encompasses the overall shaping of the piece.

Language deals with sentence and paragraph structure, vocabulary and punctuation, and the writer's voice.

Spelling takes into account students' knowledge of phonetic and visual spelling patterns and the kind of words attempted, as well as correctness of spelling.

Criteria for Assessing the Exposition/Argument Task

Content looks at the depth and range of ideas presented, and at the quality of reasoning demonstrated in the ability to provide evidence and logical argument in support of a position.

ESOL Language is applied to all students' writing regardless of their language background, but focuses on the grammatical correctness and command of English syntax, as well as sentence fluency and variation, and vocabulary.

Structure and Organisation deals with both global and local organisation: the overall structure of the writing, for example the presence of a clear introduction, development and conclusion; and its internal coherence, such as linking between and within paragraphs.

Scientific Literacy

The ISA adopts the PISA definition that 'Scientific Literacy is the ability to engage with science-related issues, and with the ideas of science as a reflective citizen'. (OECD 2013, p.7)

Each task in the Scientific Literacy assessment is defined according to its *scientific competency* and the main *knowledge type* needed to complete it successfully.

Competency Variables

Evaluate and Design Scientific Enquiry - This competency focuses on the ability to understand the goals and processes of scientific enquiry in generating empirical data and reliable knowledge about the natural world. Awareness is needed of methods of data collection by observation or experiment, in the laboratory or in the field and how this leads to the development of models and hypotheses. Skills demonstrated by those with this competency include the identification of questions that can be explored scientifically; proposal and evaluation of methods for exploring a given question scientifically; and awareness of the methods used by scientists to ensure reliability of data, to acknowledge and minimise measurement error; and ensure conclusions are objective and can be generalised.

Explain Phenomena Scientifically - Demonstrating this competency involves recall and application of appropriate scientific knowledge in a given situation. The competency includes describing or interpreting phenomena and predicting changes. It also involves explaining the societal implications of scientific knowledge and may involve recognising or identifying appropriate descriptions, explanations, hypotheses and predictions.

Interpret Data and Evidence Scientifically - Analysing and evaluating scientific data and evidence in a variety of situations are the main areas emphasised in this competency. Some key aspects of this competency include transforming data from one representation to another; and evaluating scientific arguments, assumptions, evidence and reasoning from different sources (e.g. websites, journals, newspapers, and science-related texts). Students may be required to present evidence and decisions through their own words, diagrams or other representations as appropriate. Students are required to make clear and logical connections between evidence and conclusions or decisions.

Knowledge Types

Content Knowledge involves students applying knowledge appropriate to the developmental level of 12–16 year-olds in the key scientific content areas of physics; chemistry; biology; and earth & space science. This knowledge is presented in contexts of relevance to real-life situations. The three key categories of Content knowledge are:

- *Physical Systems* which includes the structure and properties of matter, the nature of chemical change, energy and its transformations, motion and forces and the interactions of energy and matter.
- *Living Systems* which includes cell structure and function; human body systems; evolution; biodiversity; genetic variation; ecosystems and knowledge of the conditions necessary for sustaining life.
- *Earth and Space Systems* which includes structure of the Earth (e.g. lithosphere, atmosphere and hydrosphere); energy sources for the Earth; global climate; forces that shape the Earth such as plate tectonics; geochemical cycles; constructive and destructive forces; Earth history such as origin, evolution and the study of fossils; and Earth in space (e.g. solar system, gravity).

Procedural Knowledge is about the various components of the scientific process (also known as the scientific method). This includes knowledge and awareness of:

- Variables including dependent, independent and control variables;
- Principles of measurement (inherent uncertainty, replicability, accuracy/precision etc.);
- common ways of representing data using tables, graphs and charts and deciding which are appropriate in a given context; and
- Appropriate methods to investigate a scientific question such as experimental or field-based studies.

Epistemic Knowledge involves recognition of the defining features of Science. This includes:

- The ability to recognise and distinguish between observations, facts, hypotheses, models and theories;
- Recognition of the difference in purposes and goals between Science and Technology;
- Identification of scientific values such as the importance of objectivity and the commitment to elimination of bias;
- Recognition of the type of reasoning inherent in scientific argumentation, e.g. use of deduction, induction, analogy, inference, analogy or modelling;
- How the values, constructs and features of science and scientific reasoning can be used to justify the knowledge produced by Science; and
- The role of collaboration, critique and peer review in building scientific knowledge.

Content Validity

Are the tasks in the test, including what the test-takers have to do (the test subject matter) and how they do it (the test format) – likely to give good indications of test-takers' proficiency in the area being tested?

There are three salient features of the ISA to be remarked upon under this heading.

Cultural Content

A students' performance in an assessment can be affected strongly by the familiarity of the contexts in which the test questions are set, even though the contexts are extrinsic to the skills or knowledge that the questions are designed to assess. This goes to the issue of fairness: it would, in the case of a test for international school students, be unfair as well as invalid if it catered mainly for students from one particular cultural background.

The ISA is written with international school students in mind, and therefore there is a strong emphasis in the selection of test material on catering for students from a wide variety of cultural and language backgrounds. The aim is to achieve cultural eclecticism, rather than cultural neutrality, so that all test takers will, ideally, find some familiar contexts and some unfamiliar ones in any given test.

ACER has a number of mechanisms for ensuring cultural appropriateness, including in-house reviews of all material and formal requests for feedback from teachers who have administered trial material.

Task format

The ISA places a high value on open responses to questions and essays as a strong indicator of students' reading, writing and mathematical ability as well as multiple choice items. Open questions and essays measure skills that cannot be assessed in a multiple choice format. They require students to provide evidence of their own thinking processes.

The mathematical literacy, reading and scientific literacy instruments consist of 25 to 35 questions with about half the questions in multiple-choice format and half requiring short constructed-responses (anything from a single number, to a sketch, to three or four sentences). This allows for a wide range of skills, understandings and types of knowledge in the relevant areas to be interrogated. While factual knowledge and applications can be readily tested using closed test formats, it is often difficult to assess such skills as reflection and problem solving unless students are given the opportunity to generate their own responses. Also, closed format items such as multiple-choice questions need to be carefully constructed to avoid the issue of students guessing the correct response, with no understanding of the content, though of course it is not possible to avoid this issue entirely. This is not an issue in constructed-response items. The decision to balance the task formats is, at its core, a recognition of the constructivist pedagogy that is prevalent in international schools.

Writing is assessed by means of two extended responses to verbal or pictorial prompts. While it is not possible to simulate the writing process completely in a standardised testing context, some elements of that methodology are incorporated, by way of a brief class discussion of the writing topic at the beginning of the test session, and the opportunity to proof and edit at the end.

Level of difficulty of the test material

A valid test must aim to give accurate measurement of the ability of all the test takers, from the least able to the most able. If the test is too hard for the test takers, then we will have no idea of what they can do, only of what they can't. If the test is too easy, then we will not be able to estimate the limit of the test takers' proficiency.

In the ISA, the level of difficulty of the material is initially based on the test developers' notion of what is appropriate content (and language) for each grade level. Since almost all test developers are former teachers, this estimate is a solid starting point, but it is then tested empirically during trial testing, when the actual difficulty of the tasks for the target group is observed through data collection and analysis of student responses. Item Response Theory (IRT), the method of statistical analysis used by ACER, allows the proficiency of the students and the difficulty of the tasks to be calibrated on the same scale. This technique enables us to select tests that match the range of proficiency levels of the target group, allowing us to construct tests that will measure with reasonable accuracy the proficiency of students at every level: the least proficient students (with some very easy items) as well as the most able students (with some very challenging items).

Test Reliability

Reliability is about whether the test is measuring the variable of interest in a consistent way, such that one can generalise about the result. Things that can undermine reliability include tests composed of items that measure many different things, so that the result does not tell anything very meaningful about any particular thing.

A simple summary of this kind of reliability is provided by the internal consistency statistic. This figure shows the extent to which all the items in the test are measuring something similar. A figure of 0.8 indicates that 80% of the variation in the measures is related to the construct (what we are trying to measure), and 20% of the variation in the measures is related to variation of things other than the construct: or "noise" (termed "measurement error"). A figure of 0.8 is considered a good statistic for internal consistency.

Overall, the ISA test reliabilities have means in the range of 0.79 to 0.87 from grade 3 to grade 10, which indicates that ISA tests have very good reliability for mathematical literacy and reading from 2002 to 2015, and for ISA scientific literacy from 2013 to 2015. (Since the two kinds of writing are each assessed by only one task, internal consistency statistics cannot be calculated for this domain). The standard deviations are in the range of 0.01 to 0.04, which means that the reliability values are consistently good. If you would like to view tables showing the internal consistency figures for mathematical literacy, reading and scientific literacy from 2002 to 2015 please email isa@acer.edu.au

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2015–16 Participating Schools

Over 76,000 students in 355 schools participated in ISA 2015–16. The following 225 schools have given permission for their school's name to be published by ACER for information, general reporting, and/or publicity purposes.

ASIA

AZERBAIJAN
Baku-Oxford School

BANGLADESH
International School Dhaka

CAMBODIA
Hope International School
International School of Phnom Penh
Northbridge International School Cambodia

CHINA
BASIS International School Shenzhen
Beijing City International School
Beijing World Youth Academy
Changsha WES Academy
Daystar Academy
Guangzhou Grace Academy
International Montessori School of Beijing
International School of Qingdao
Jurong Country Garden School
Nanchang International School
Nanjing International School
Shanghai United International School
Shanghai World Foreign Language Primary School
Shen Wai International School
Suzhou Singapore International School
Utahloy International School, Guangzhou
Utahloy International School, Zengcheng
Western Academy of Beijing
Wuxi Taihu International School
Yew Chung International School, Beijing
Yew Chung International School Shanghai
Zhuhai International School

HONG KONG
Beacon Hill School
Canadian International School of Hong Kong
Discovery College
Glenealy School
Island Christian Academy
Kennedy School
Kowloon Junior School
Quarry Bay School
Renaissance College
Sha Tin Junior School
The Independent Schools Foundation Academy
Victoria Shanghai Academy
Yew Chung International Primary School

INDIA
Ascend International School
Good Shepherd International School
Indus International School, Pune
International School of Hyderabad
Lancers International School
Oberoi International School
RBK International Academy
Victorious Kidss Educares

INDONESIA
Bali Island School
Bandung Independent School
Binus International School Simprug
Intercultural School of Bogor
Jakarta Intercultural School
Mt Zaagkam School
Sanur Independent School
Sekolah Bogor Raya
Semarang Multinational School

JAPAN
Aichi International School
Aoba-Japan International School
Canadian International School
Deutsche Schule Kobe/European School
Fukuoka International School
International School of the Sacred Heart
K. International School Tokyo
Kyoto International School
Makuhari International School
Nagoya International School
New International School of Japan
Osaka YMCA International School
Tamagawa Academy K-12 & University
The Montessori School of Tokyo
Tohoku International School
Tsukuba International School
Yokohama International School

MALAYSIA
Australian International School Malaysia
IGB International School
International School of Kuala Lumpur

MYANMAR
Ayeyarwaddy International School
International School Yangon

NEGARA BRUNEI DARUSSALAM
Panaga Shell School

PHILIPPINES
Domuschola International School

SINGAPORE
ISS International School
One World International School

SOUTH KOREA
Busan International Foreign School
Hyundai Foreign School
International School of Koje
Seoul International School
Taejon Christian International School

SRI LANKA
Global Life International School

THAILAND
Anglo Singapore International School
Bangkok Patana School
Chiang Mai International School
Gecko Community School
Heathfield International School
International School Bangkok
NIST International School
Phuket International Academy School
PTIS International School
RC International School
St. Mark's International School

VIETNAM
European International School HCMC
Hanoi International School

EUROPE

ALBANIA
World Academy of Tirana

AUSTRIA
Amadeus International School Vienna
Danube International School
Vienna International School

BELGIUM
St John's International School
The British School of Brussels

DENMARK
Copenhagen International School

FRANCE
American School of Grenoble
The International School of Nice

GERMANY
Berlin Brandenburg International School
Berlin British School
Dresden International School
International School Hannover Region
International School of Bremen
International School of Hamburg
International School of Ulm/Neu-Ulm
Metropolitan School Frankfurt gGmbH
Munich International School
SIS Swiss International School Ingolstadt
SIS Swiss International School Friedrichshafen
Strothoff International School
Thuringia International School

ITALY
American School of Milan
International School of Como
International School of Modena
International School of Trieste and Udine
International School of Turin
The International School in Genoa
The International School of Naples
The Udine International School

NETHERLANDS
American School of the Hague
NLNG School

NORWAY
Arendal International School
International School of Bergen
Skagerak Middle and Primary School

POLAND
British International School of Cracow
British International School of Wroclaw

ROMANIA
American International School of Bucharest

SPAIN
Benjamin Franklin International School
The American School of Barcelona

SWEDEN
Futuraskolan International School of Stockholm
International School of Almhult
International School of Helsingborg
International School of Lund – Katedralskolan
International School of the Gothenburg Region
International School of the Stockholm Region

SWITZERLAND
Inter-Community School Zurich
International School of Berne
International School of Lausanne
International School Schaffhausen
John F. Kennedy International School
SIS Swiss International School Basel
SIS Swiss International School Rotkreuz-Zug
Zurich International School

TURKEY
Bilkent Laboratory and International School

UNITED KINGDOM
International Community School
International School of Aberdeen
Southbank International School, Hampstead
The King Fahad Academy

AFRICA & MIDDLE EAST

ANGOLA
Luanda International School

BAHRAIN
Shaikha Hessa Girls' School

COTE D'IVOIRE
Morning Glory International School

ERITREA
Asmara International Community School

GHANA
Dayspring International Academy

JORDAN
The International Academy Amman

KENYA
International School of Kenya
The Aga Khan Academy, Mombasa

KUWAIT
Kuwait Bilingual School

LEBANON
Brummana High School
Universal College – Aley

MALAWI
Bishop Mackenzie International School

MAURITANIA
TLC International School

MAURITIUS
International Preparatory School
Le Bocage International School

MOZAMBIQUE
American International School of Mozambique

NIGER
American International School of Niamey

NIGERIA
Discovery House Montessori School
Ibadan International School

OMAN
Seashell Primary School
ABA - An IB World School

QATAR
Qatar Academy Al Khor
Qatar Academy Doha

SAUDI ARABIA
International Program School in Al-Khobar
Nobles International School

SOUTH AFRICA
American International School of Cape Town

TANZANIA
Geita Gold International School
International School Moshi
International School of Tanganyika
Iringa International School
Kwanza International School
The Aga Khan Primary School and Mzizima Secondary School
The Latham School

UGANDA
Acorns International School

UNITED ARAB EMIRATES
Dar al Marefa Private School
GEMS American Academy - Abu Dhabi
GEMS World Academy - Dubai
Jebel Ali Primary School
Nibras International School
Sheikh Zayed Private Academy for Boys
Springdales School Dubai

ZIMBABWE
Harare International School

AMERICAS

BRITISH VIRGIN ISLANDS
Cedar International School

COLOMBIA
FECEN Colegio Albania

MEXICO
American Institute of Monterrey
American Institute of Monterrey - Valle Oriente

USA
Atlanta International School
BASIS Ahwatukee
BASIS Chandler Primary
BASIS Goodyear
BASIS Independent Brooklyn
BASIS Mesa
BASIS Oro Valley Primary
BASIS Phoenix Central
BASIS Prescott
BASIS Tucson
German-American International Schoo
Riverstone International School
Westlake Academy
Whitby School

US VIRGIN ISLANDS
Virgin Islands Montessori School & Peter Gruber International Academy

OCEANIA

FIJI
International School Suva

PAPUA NEW GUINEA
The Ela Murray International School
The International School of Lae