ISA Background

In December 2001 the Australian Council of Educational Research (ACER) launched the International Schools’ Assessment (ISA). The idea for the program evolved from two sources: discussions with international school people, and our involvement in PISA.

In consultation with international schools in the East Asian region, ACER learned about the need for an assessment instrument designed for their particular 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. In addition, international schools were looking for an assessment program that would provide them with quantitative and qualitative feedback which could be used for improving learning, as well as for making comparisons with other relevant populations.

The second source of inspiration was ACER’s role in PISA, the Programme for International Student Assessment, which is an on-going project initiated by the Organisation for Economic Co-operation and Development. On a three-yearly cycle, it assesses 15-year-olds in over 60 countries in key learning domains in order to inform national stakeholders about how well their education systems are preparing young people for life after compulsory education. 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.

Purpose

The ISA is an achievement test for students in international schools. It is designed to serve a number of purposes for these schools, enabling them to:

• evaluate instructional programs against objective evidence of student performance, to identify gaps in student understanding, and to measure growth in learning, between grade levels and from year to year within one grade level;

• provide normative data in relation to selected populations;

• compare subgroup performance (for example, girls and boys; students from different language backgrounds) to see where there may be unexpected results and try to understand them;

• measure individual students’ achievement in order to reflect on and address strengths and weaknesses; and

• monitor an individual’s or a cohort’s progress over time.

Target Population

The assessment is designed for students in Grades 3, 4, 5, 6, 7, 8, 9 and 10 in international schools worldwide. Schools can administer the tests in either October or February.

Construct

The ISA assessment has three components: Mathematical Literacy, Reading and Writing. The Mathematical Literacy and Reading frameworks are based on those developed for OECD PISA.

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 perform 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 patterns 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.

*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

Retrieving Information is defined as locating one or more pieces of information in a text.

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

Reflecting 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 approaches, 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 task and one expository/argumentative task.

For the Narrative task the students are asked to write a story, either imaginary or based on experience. The stimulus may be a phrase, a sentence or 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 prompt can be the same for all grades or different topics may be offered for Grade 3, 4, 5, 6 and 7 and for Grade 8, 9 and 10.

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 Task

The Content criterion is about the quality and range of ideas presented, the development of plot, characters and setting, and the writer’s sense of audience and purpose. It also encompasses the overall shaping of the piece.

The Language criterion deals with sentence and paragraph structure, vocabulary and punctuation, and the writer’s voice.

The Spelling criterion 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

The Content criterion 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.

The ESOL Language criterion 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.

The Structure and Organisation criterion 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.

Test format

The Mathematical Literacy and Reading 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 two or three sentences). The Writing instruments are verbal or pictorial prompts that require extended written responses. Four to five lined pages are provided within the test booklets for responses to the Writing tasks.

Test conditions

The ISA is administered to classes by classroom teachers equipped with test administration manuals. There are two Mathematical Literacy sessions, one Reading session and two Writing sessions. The ISA is administered on two mornings within a testing window of two weeks. The test material is secure; all administrators and others who handle the booklets in a school are asked to sign a confidentiality agreement form, and are required to return all test booklets, used or unused, to ACER.
Administration

The assessments are in pencil and paper form. Test booklets are provided that contain the stimulus and the tasks. Students enter their responses in the booklets. All test material (for Mathematical Literacy, Reading and Writing) is contained in one student booklet. Calculators may be used for Mathematical Literacy. Non-English speaking background students are allowed to use dictionaries or translation devices for Mathematical Literacy only.

Depending on the grade level, each assessment session takes 45 minutes to one hour. Students are allowed around five minutes extra time if needed, since speed is not part of the proficiency that is being assessed.

ACER provides a detailed school coordinator’s manual and administration manuals in paper form. The manuals are also available by email in PDF format prior to the testing administration period. The test materials are sent to schools by courier and schools are required to return all material (used and unused) by the same means.

Marking and data entry

All marking is conducted 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 and Reading 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. The markers receive initial training in the use of the ISA marking guides and then follow-up training throughout the marking operation. The accuracy of the marker is checked against standard scripts for quality control. Marking is conducted on-screen following the scanning of testing booklets. The information from the front cover of testing booklets (student name, gender etc) is data entered and returned to schools for checking and updating prior to the release of reports.

Reporting

Reports are delivered to schools via secure web page set up for each participating school.

The ISA reports numerical results in terms of scaled scores linked to the PISA scales for Mathematical Literacy and Reading. The average proficiency of 15-year-old students in OECD countries in Mathematical Literacy and Reading Literacy was set at 500, with a standard deviation of 100, for the year 2000. In the second PISA data collection, in 2003, the mean performance in Mathematical Literacy was re-set at 500. In 2006 the mean was 498 and in 2009 it was 496. In Reading, the scale established in PISA 2000 was retained and the mean performance in PISA 2003 was 494, in 2006 it was 492 and in 2009 it was 493. The ISA scale scores in Mathematical Literacy and Reading have been equated with the relevant PISA scales. The Writing scales are not based on PISA but the scale scores use a similar metric.

The ISA also has developed described proficiency scales based on the PISA 2000 reporting. ISA Reading is reported in terms of ten described levels of achievement across three aspects (Retrieving Information, Interpreting and Reflecting); ISA levels 3 to 9 are virtually identical with PISA Reading Literacy levels 1b to 6. In ISA Mathematical Literacy, four content-based scales (Uncertainty, Space and Shape, Quantity and Change and Relationships) 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 ISA Writing there are ten described levels of achievement for Narrative Writing, and nine described levels for Expository/Argumentative Writing.

Six types of reports are available to schools. Table 1 summarises the reports in terms of audience, purpose and content.

A manual, Guide to ISA Reports, is delivered along with the school’s reports. Examples of the reports and the Guide can be found on the web at http://www.acer.edu.au/tests/isa/sample-reports3
Table 1 Summary of school reports

<table>
<thead>
<tr>
<th>Type of report</th>
<th>Broad description</th>
<th>Purpose</th>
<th>Intended primary audience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Student</td>
<td>For each individual, student’s overall performance in each domain (Mathematical Literacy, Reading and Writing) in relation to described levels of proficiency</td>
<td>Provide information about the individual student’s current level of proficiency in each domain</td>
<td>Individual students and their parents</td>
</tr>
<tr>
<td>Class</td>
<td>For each class, item-by-item and aggregated record of individual students’ results</td>
<td>Provide diagnostic information about class, sub-group and individual performance on significant clusters of items</td>
<td>Class teachers, subject and grade level coordinators</td>
</tr>
<tr>
<td>School</td>
<td>For each school, aggregated school data on performance by grade level and subgroup, including comparisons with like schools, all schools</td>
<td>Provide the basis for trend analysis and school-level target setting</td>
<td>Heads, curriculum coordinators, school boards</td>
</tr>
<tr>
<td>Grade 10 National Comparisons</td>
<td>For Grades 8, 9 &amp; 10 Reading and Mathematical Literacy only, comparison of school’s performance against performance of 15-year-old populations in over 65 countries (from PISA 2009 data).</td>
<td>Provide a broad picture of school’s performance in relation to relevant national groups</td>
<td>Heads, curriculum coordinators, school boards</td>
</tr>
<tr>
<td>Interactive Diagnostic Report</td>
<td>For each school, interactive spreadsheet shows results in a range of graphic displays which makes it easier to identify trends and patterns in comparison with all other ISA schools and to interpret diagnostic information.</td>
<td>Provide instant customisation of reports in graphic formats so schools can interpret and use the ISA data to inform improvements in teaching and learning.</td>
<td>Class teachers, subject and grade level coordinators, heads, curriculum coordinators</td>
</tr>
<tr>
<td>Interactive Tracking Report (at additional cost)</td>
<td>For each school, interactive spreadsheet shows performance against ISA benchmarks and tracks performance of individual students and cohorts over time.</td>
<td>To monitor the performance over time of individual students and of different groups of students within a school and to determine whether student performance has changed in relation to ISA benchmarks.</td>
<td>Class teachers, subject and grade level coordinators, heads, curriculum coordinators</td>
</tr>
</tbody>
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Consultation and feedback

ACER has had ongoing consultations with faculty of many international schools and others involved in international education, through attendance at the European Council of International Schools’ Administrators’ conferences, the East Asian Regional Council of Schools annual conferences for both teachers and administrators, and the African International Schools Association Administrators’ Conference. 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, questionnaires to teachers and administrators during both trial and main study administration, and through reference group meetings with representatives of invited participating schools.

Further information

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