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PISA from Australia's perspective

Jan Lokan

Dr Jan Lokan began a long career in education as a secondary mathematics teacher, soon becoming a lecturer in mathematics, statistics and research methodology at tertiary level. She moved from Australia to Canada in 1968, leaving teaching for a full-time position in educational research with the Ottawa Board of Education, beginning as a developer of mathematics assessment materials for research projects in Ontario schools. On returning to Australia in 1978, she took up an appointment at ACER, undertaking mostly survey studies with a wide range of purposes: instrument development and validation; program evaluation; curriculum implementation; career development of secondary students; and large-scale studies of student achievement.

Jan has had extensive involvement in international studies. She directed the Australian components of the international *Work Importance Study* (led by Professor Donald Super of Teachers College Columbia University in New York); the *Third International Mathematics and Science Study* (TIMSS); the *TIMSS-Repeat Video Study*; and the first cycle of the OECD *Programme for International Student Assessment* (PISA). She has served on several international committees in connection with these studies and was also part of the international management team for PISA, which was coordinated from ACER. She has published several books, book chapters and articles related to these studies.

At the time of her retirement in December 2001, Jan was Deputy Head of ACER's Measurement Division.

In 2000, along with more than a quarter of a million similar-aged students from 31 other countries, just under 6,200 Australian teenagers took part in the first Programme for International Student Assessment (PISA) survey. In all countries the students comprised national random samples of students aged between 15 years 3 months and 16 years 2 months at the time they were assessed. In Australia, they were sampled from all states, territories and education sectors. Development of the survey tests and questionnaires began in 1998, and the survey itself occurred between February and May 2000 in the northern hemisphere and between July and October 2000 in the southern hemisphere. Twenty-eight of the participating countries were OECD member countries. Non-OECD countries involved were Brazil, Latvia, Liechtenstein and the Russian Federation.

PISA is an initiative of the Organisation for Economic Co-operation and Development (OECD) in Paris, which was keen to have measures of outputs from compulsory level schooling to accompany its regularly collected country-level data on education contexts and investments of human and monetary resources in education. Each year the input data are featured in the OECD's publication, *Education at a Glance*. PISA is planned to occur every three years, to provide measures of 15-year-old students' skills on a regular basis and to enable trends in performance to be monitored over time. PISA is implemented internationally by a consortium led by the Australian Council for Educational Research (ACER), which also manages the survey within Australia under the guidance of a National Advisory Committee.¹

Goals and features of PISA

PISA is forward-looking, being primarily concerned with how well students are likely to cope with their lives in the future rather than with how much of their formal curricula they have learned. It asks policy-relevant questions of a broader nature:

- How well prepared are young people to deal with the challenges they will meet in the future?
- What skills do young people have that will help them adapt to change in their lives? Are they able to analyse, reason and communicate their ideas effectively? Do they have the capacity to continue learning throughout life?
- Are some ways of organising schools and school learning more effective than others in helping students to develop such skills?
- What influence does the quality of school resources have on students' learning?
- To what extent is students' performance dependent on their home backgrounds?
- Do the results point to ways in which school systems can be made more equitable for all students?

Data to facilitate answers to these questions were collected from students and school principals through comprehensive questionnaires and specially prepared tests in the domains of reading, mathematics and science, defined in a broad way as 'literacies'. All instruments were developed through a highly collaborative process by the countries participating in the survey.

PISA is an unprecedented attempt to measure student skills across participating countries, as is evident from the following features:

- *Its 'literacy' approach:* PISA defines each main assessment domain (reading, mathematics and science) not merely in terms of mastery of the school curriculum, but in terms of important knowledge and skills needed for full participation in society;²
- *Its long-term commitment:* spanning at least the decade to come, PISA will enable countries to monitor their progress in meeting key learning objectives;

¹ The Commonwealth, State and Territory governments fund the Australian component of PISA.

² Other papers in this volume present the definitions and discuss the scope of PISA's three main domains, which are therefore not included here.

- *The age group covered:* assessing young people near the end of their compulsory schooling provides a significant indication of the performance of education systems; and
- *Its relevance to lifelong learning:* PISA does not limit itself to assessing the knowledge and skills of students but also asks students to report on their own, self-regulated learning, their motivation to learn and their preferences for different types of learning situations.

Scope of PISA in Australia

Altogether, 231 of the 246 randomly selected Australian schools participated in the survey. This constitutes a school response rate of 94 per cent, unprecedented in similar large-scale achievement surveys in Australia. The response rate was uniformly good throughout the states and territories. The numbers of schools participating from each system were: NSW, 40; Victoria, 34; Queensland, 35; SA and WA, 29 each; Tasmania, 24; Northern Territory, 17; and ACT, 23. Schools in Tasmania, the NT and the ACT were oversampled to enable state-based as well as national reporting of results. Australia-wide, two thirds of the schools were government schools, about a fifth were Catholic schools and a little less than a sixth were independent schools. About two-thirds of the 231 schools were from large urban areas, a further quarter were from towns with populations of 15,000 to 100,000, and the remainder were from smaller country towns.

The main achieved sample comprised 5,176 students. An additional 301 Indigenous students were assessed to enable accurate reporting of results for this student sub-group. Sampling weights were used in determining national and state results so that the numbers of students by state and sector reflected the proportions in the total population in each case.

Australian perspectives on PISA 2000 results

Some highlights of results, indicative of the overall picture, are summarised here. More results will be illustrated and discussed in the presentation.

Overall results in main assessment domains

Australian students, on the whole, performed consistently very well in all three of the main assessment domains. Only one country achieved a better result than Australia in each of reading (Finland) and mathematics (Japan), and only two countries achieved a better result in science (Korea and Japan).

The comparative results from Australia's perspective are presented in Figures 1 to 3. The country results in each case were estimated from a random sample and show the mean and 95 per cent confidence range (the band in which country results would be expected to fall 95 per cent of the time if random samples of students were repeatedly drawn from the same target population). The figures show that there are very few countries anywhere in the world where 15-year-olds are provided with reading, mathematical and scientific literacy skills above those being achieved in Australia.

Within Australia, comparisons between the state and territory results showed more similarities than differences. All the state and territory results were at or above the OECD average.

Descriptions of five levels of reading proficiency measured in PISA were prepared by an international committee of reading experts. This was done so that results could be presented in a more informative way than merely reporting means and statistical distributions.³ The overall results according to percentages of students at each proficiency level are shown in Figure 4. On average, 10 per cent of students demonstrated the top level of proficiency, being able to understand complex texts, evaluate information and develop hypotheses, and draw on specialised knowledge. In Australia, Canada, Finland, New Zealand and the UK, the percentages of students at the top level ranged from 15 to 19. At the other end, the percentage of Australian students who could not do tasks beyond Level 1, at 9 per cent, was only half the OECD average. Students at this level show serious gaps in their foundation reading literacy skills, impairing their ability to benefit from further schooling or workplace training.

The Australian students' achievements and their distribution by reading proficiency level within states and territories will be illustrated and discussed in the presentation.

Sub-group results in main assessment domains

In every country that took part in PISA, girls were, on average (and usually also at the highest proficiency level), found to be better readers than boys. Even in the high achieving countries, boys were more likely than girls to be at Level 1 or below in reading proficiency. In about half the countries, but not Australia, boys outperformed girls in mathematical literacy. Australia, along with 25 other countries, also had no gender difference in scientific literacy (in three countries girls outperformed boys and in a further three, boys outperformed girls).

³ See the paper by Mendelovits in this volume for details of the proficiency levels.

In all countries, students who spoke a language other than the language of the test at home most of the time had lower mean reading literacy scores than students who spoke the language of the test. However, in Australia the discrepancy between these two groups in reading literacy was smaller than in any other country, and there was no discrepancy in their mathematical literacy scores. The country percentages of non-test-language speakers varied from about two per cent in Finland, Iceland, Portugal and Spain to 20 per cent in Liechtenstein. In Australia, 17 per cent of students came from households where English was not the main language spoken.

The performance of Australian Indigenous students in each of reading, mathematical and scientific literacy was considerably lower than the performance of non-Indigenous students.⁴

Overall results in other domains

Use of appropriate strategies for learning, and possession of positive attitudes to learning information technology and self-improvement, are also relevant to coping in life beyond school. It is encouraging that only five per cent of the girls and eight per cent of the boys in the Australian PISA sample had no intention of continuing their education beyond school, and two-thirds of the girls and almost 60 per cent of the boys intended to complete at least an undergraduate university degree (this question was not included in other countries' questionnaires).

Three kinds of learning strategies were measured, as an indication of how well students would be able to manage their own learning in the future. The strategies were: the extent to which students *controlled* their own learning – for example, by setting goals and priorities; the extent to which they used *elaboration* strategies – for example, by making the effort to integrate new learning with things they already knew; and the extent to which they learned by *memorising*. The Australian students were at the OECD average except for memorising, on which they were substantially above the OECD average. All of the learning scales were positively related to achievement, but the deeper strategies of controlling and elaborating were more strongly related.

Australian students' attitudes to school and to reading in particular were relatively low. Close to a quarter of the students said that school was a place where they did not want to go. This was not unique, but the level of negativity towards school in Australia was higher than the OECD average. 'Engagement with reading' was the most highly correlated of the attitudinal variables with reading achievement. Australian students' result on this scale was at the OECD average overall, but there was a predictable gender difference that gives rise to concern.

School and background factors

PISA gives insights into home background, student and school factors that are associated with the development of the students' skills, many of which provide messages for education policy makers:

- The relationship between socioeconomic background and reading achievement was higher in Australia than in the majority of countries.
- Boys from disadvantaged backgrounds were much more likely than girls to be in the lowest quarter of reading scores.
- Boys were much less engaged in reading than girls and were relatively at a loss in dealing with narrative texts.
- A third of Australia's students said they never read for enjoyment – this percentage was higher in some countries, but the gap in reading achievement between students who never read for enjoyment and those who read for an hour or two a day was greater in Australia than in any other country.
- Higher amounts of homework done were related to achievement in Australia, as in many other countries.
- In Australia, higher teacher morale, a more positive disciplinary climate and greater amounts of support offered by teachers to their students were the most important school factors associated with achievement. The first two of these were at or below the OECD average, but Australia, together with the UK, scored relatively high on the index of teacher support.

Policy messages from the above and other findings presented earlier in the paper are reasonably clear: we need to continue to provide supplementary programs to improve the skills of students who are struggling, particularly Indigenous students and boys, and especially if they are from disadvantaged backgrounds. We need to make school a more attractive place for 15-year-olds and to think of ways we can help students to become more enthusiastic about reading and to engage in it more than they currently do. Teachers and parents need to encourage students to do their homework and school conditions need to be as favourable as possible in terms of teacher morale, discipline standards and teacher support of students. Australia was mostly at the OECD average on these kinds of variables, sometimes above – but there is still room for improvement.

⁴ See the paper by Hughes, Greenwood & Frigo in this volume for further details.

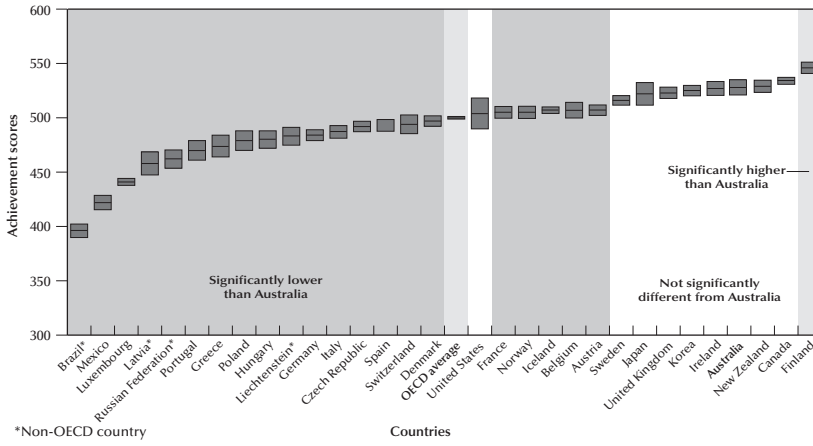


Figure 1: Best Estimates of Reading Literacy Means by Country.

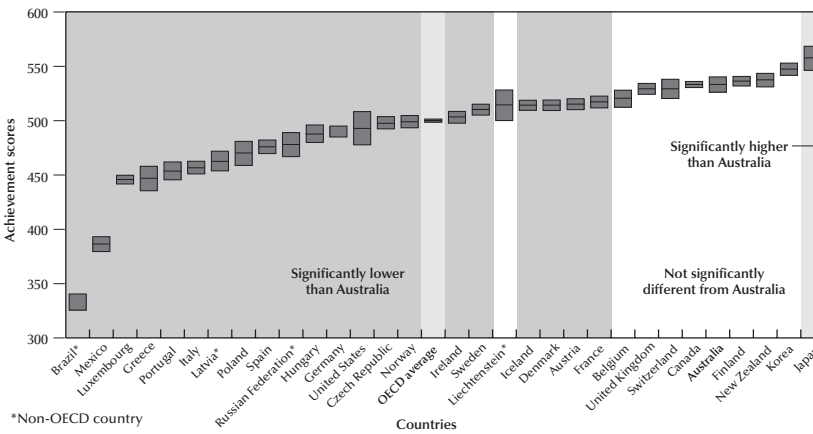


Figure 2: Best Estimates of Mathematical Literacy Means by Country

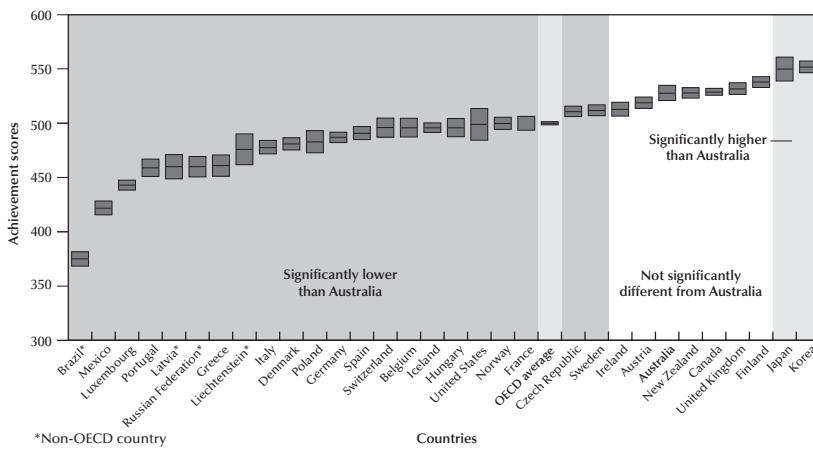


Figure 3: Best Estimates of Scientific Literacy Means by Country

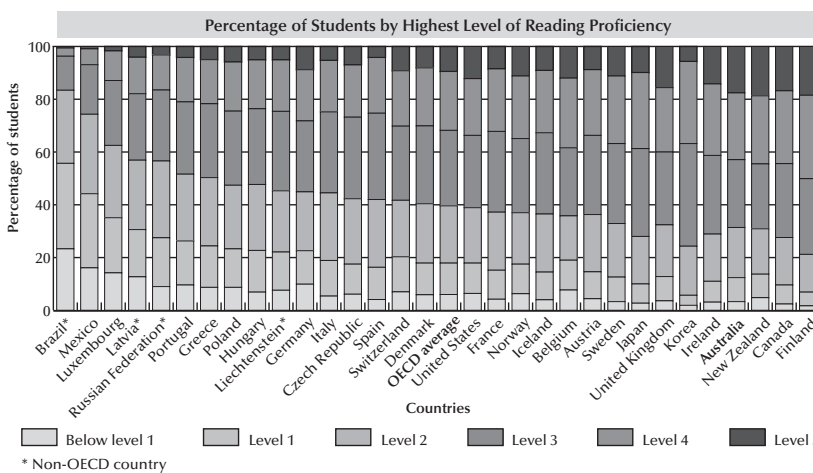


Figure 4: Distribution of Students by Reading Proficiency Level