

A·C·E·R

NEWSLETTER

Edited by John King

International Comparisons of Science Achievement

The science achievement of Australian students is about average when compared with other countries. Preliminary results of a major international study of science education also show that the Australian performance is lower than that of many countries which are its economic competitors.

The place of science in the school curriculum is justified for two reasons. First, it has a role in helping students to understand their environment and to develop skills in the application of scientific methods to the solution of problems. Second, it provides basic training for those students who will subsequently follow careers in science and technology.

These aspects of the school science curriculum reflect two strands in strategies for national development. One strand requires the population as a whole to have a good understanding of the purposes and scope of science and technology so that the citizens may share as well-informed participants in the process of national development. The associated strand is the need for the country to have a sufficiently large group of persons trained in science and technology to work in those aspects of national development that depend on technical competence.

Second International Science Study

The Second International Science Study (SISS) is being conducted under the auspices of the International Association for the Evaluation of Educational Achievement (IEA), which is the major non-governmental association of educational research institutes. The International Coordinating Centre for the study is at the Australian Council for Educational Research (ACER). The

International Coordinator of the SISS, Dr Malcolm J. Rošier, is a member of ACER's research staff.

Three major reports of the SISS, to be published in 1989, will include results from 24 educational systems (countries). This article is based on initial results which have been released for 17 of these countries. The major reports will contain more details about student performance and attitudes, and provide explanations for the differences that are observed between students and between countries. It is not possible in this article to offer more than a glimpse of the basic results, with only minimal explanations for the international differences.

The study has been conducted at three points in the education system, referred to as the 'target populations'.

- 'Population 1' is defined as all students of age 10 years or all students at the year level where most of the students are of age 10 years (the 'modal' year).
- 'Population 2' is defined as all students of age 14 years or all students at the year level where most of the students are of age 14 years.
- 'Population 3' is defined as all students studying any science subject in Year 12.

This article deals only with Population 2. Future reports will cover other populations.

The basic sampling design adopted for the study was a two-stage stratified probability design. At the first stage of sampling, schools were selected within strata with a probability proportional to the size of the target population. At the second stage of sampling, students were selected at random from these schools. Tables in this article include the size of the samples for each country; further details about sampling will be included in later reports.

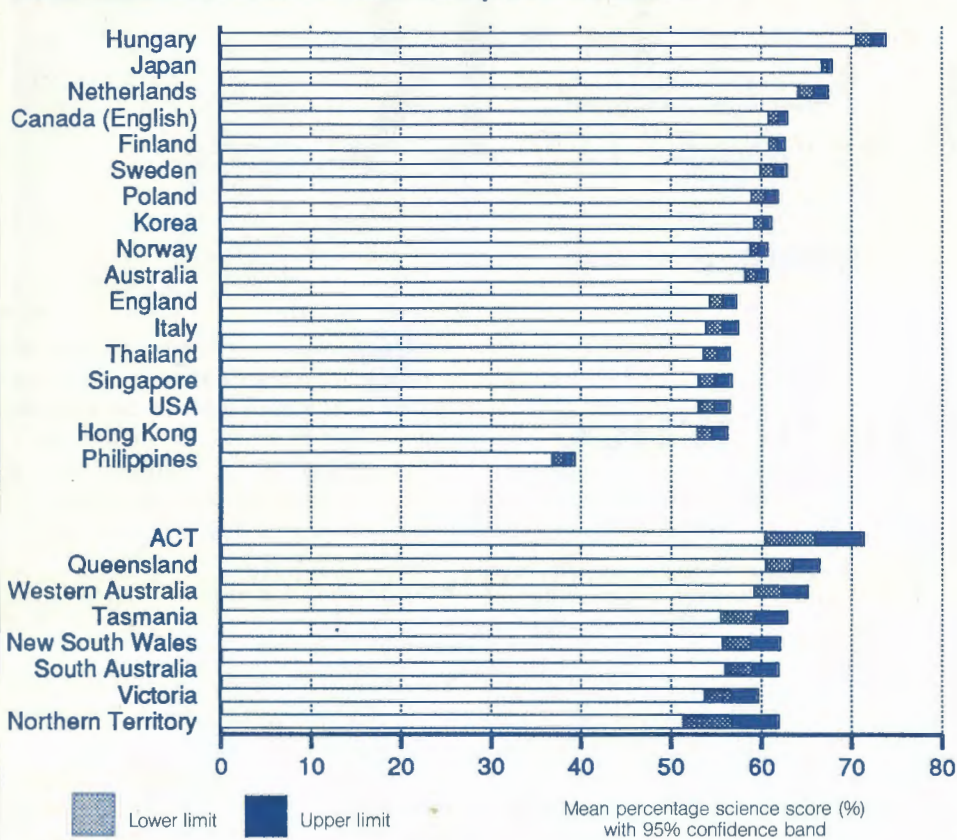
Data for the study were collected by



Inquiries and orders can be directed to the Sales and Distribution staff at ACER – from left to right, Alan Wilkins (manager), Dilsie Evans (stock control clerk), Wendy Birrell and June Manuel (sales clerks), Christine Higgins (assistant manager), Jan Gardner (sales clerk), and Mattie Smith (special and overseas orders). Telephone 03-819 1400 from 9.00 a.m. to 5.00 p.m. weekdays or write to Sales and Distribution, ACER.



Achievement in Science of Fourteen-year-old Students



| Mean age | Year level | Sample size |
|----------|------------|-------------|
| 14:3 | 8 | 2 515 |
| 14:7 | 9 | 7 610 |
| 15:6 | 9 | 5 125 |
| 15:0 | 9 | 5 543 |
| 14:10 | 8 | 2 546 |
| 14:9 | 8 | 1 461 |
| 15:0 | 9 | 4 520 |
| 15:0 | 9 | 4 522 |
| 15:10 | 9 | 1 420 |
| 14:5 | 8, 9, 10 | 4 917 |
| 14:2 | 9 | 3 118 |
| 14:7 | 8, 9 | 3 228 |
| 15:4 | 9 | 3 780 |
| 15:3 | 9 | 4 430 |
| 15:4 | 9 | 2 519 |
| 14:7 | 9 | 4 973 |
| 16:1 | 9 | 10 874 |
| 14:6 | 8, 9 | 211 |
| 14:5 | 9, 10 | 853 |
| 14:5 | 9, 10 | 789 |
| 14:7 | 8, 9, 10 | 790 |
| 14:5 | 9, 10 | 759 |
| 14:5 | 8, 9 | 509 |
| 14:6 | 8, 9 | 766 |
| 14:5 | 8, 9, 10 | 232 |

means of a series of specially prepared tests, attitude scales, and questionnaires. The preparation of the science tests was a complex task, with considerable discussion and negotiation among the participating countries. Some of the characteristics of the tests reflect the special problems of making comparisons between countries.

Consequently, the tests do not reflect the science curriculum of any single country, but are based on an international consensus curriculum derived from a detailed analysis of science curriculum content ratings supplied by the participating systems.

It was also necessary for the tests to contain sufficient items to give a reasonable sampling of the consensus curriculum. This was achieved at the Population 2 level by having a 'core' test of 30 items to be done by all students in the sample, and a set of four 'rotated' tests, each of which contained ten items. Each student was assigned at random to two of these tests. This meant that each student answered a total of 50 items, but that data for the country overall were available on a total of 70 items.

The test items cover three defined teaching behaviour levels – knowledge, comprehension, and application – as well as providing a balance of items in earth science, biology, chemistry and physics.

International Results

The accompanying figure presents the results for Population 2. For each country it shows the mean percentage of items answered correctly by the sample students for the core test of 30 items (mean percentage science score). At the end of each horizontal bar, we show the lower and upper limits for the values if the whole population had been tested, estimated with 95 per cent probability. The figure also shows the mean age of the students, the year level at which the testing took place, and the number of students in the sample. The 14-year-old students in the Australian sample were drawn from three year levels, and included 19 per cent from Year 8, so the modal year level was Year 9, as in most of the other countries.

Differences between countries (or between states of Australia) are significant where the upper limit for one country is less than the lower limit for another country.

Hungary is clearly the country with the highest mean score, followed by Japan and the Netherlands. The next seven countries, including Australia, are fairly close together, just above the mean for all 17 countries. Australia effectively ties for fourth place with these countries. Next there is a group of six countries with similar scores, and finally the Philippines.

In order to make fair comparisons between the countries, it is necessary to take account of other factors, including the mean age and year level. For example, although the mean age of the students in Finland and Sweden is higher than in Australia, their samples were drawn from Year 8. The score for Norway would probably have been lower if its sample had also been drawn from Year 8, with consequently younger students. The mean age of students in the sample for the Netherlands is about one year higher than for Australia, and for Hungary and Japan at the top of the list.

Many of the developing countries have fewer than 100 per cent of the eligible school-age persons in school. The examination of the results for the Philippines and Thailand must take account of the fact that the percentages of the population in school are about 60 per cent and 32 per cent, respectively.

Australian Results

The Australian mean score (also shown in the figure) is a weighted mean of the scores for the eight Australian states and territories, where the weights are based on the number of 14-year-old students in each state. It follows that the Australian mean is primarily influenced by the results for the largest states: New South Wales and Victoria.

The individual state scores are shown at the foot of the figure, and can be compared with those of other countries. The distribution of 14-year-old students

by year levels differs across states. The figure shows, for each state, the year levels that contain more than 10 per cent of the students in the sample.

The scores for the Australian Capital Territory, Queensland, and Western Australia are clearly higher than for the other states, and compare favourably with those of the high-scoring countries. The next group of Australian states has similar scores, which are the same as the international mean. The lowest state scores are in Victoria and the Northern Territory.



Dr Malcom Rosier

Conclusion

These preliminary results show that, on a general science test given to comparable samples of students in 17 countries, the performance of Australia was about average. However, knowledge of the mean scores on their own is of limited use. It is more important to find reasons for the differences between countries. This work will be described in subsequent reports.

One possible reason for the differences lies in the content and structure of the science curriculum. Most of the countries have science curricula that are prescribed, to a greater or lesser extent, by national authorities; all students systematically cover a range of content areas as they proceed through the different stages of schooling. Indeed, much of the improvement in performance in Hungary is probably due to the deliberate attempt it made to improve the science curriculum, stimulated by the results of the First International Science Study in 1970.

By contrast, most responsibility for decisions about the content of the science curriculum in Australia has been assigned to individual schools.

Under such a decentralized system, some students may fail to receive systematic exposure to an adequate range of science content and processes.

Reasons for the differences between the Australian states are currently being investigated, including differences in the content of the science curriculum, in the year level of the students, in the time spent on teaching science, and in characteristics of the science lessons.

Future reports of this study will describe results for the other target populations, and begin to offer reasons for the observed differences.

Further information about the Second International Science Study may be obtained from Dr Malcolm J. Rosier, Chief Research Officer, at ACER.

Educational Computing: Ritual or Revelation?

ACER and the Computing in Education Group of Victoria are holding a joint conference on computers in education – Educational Computing: Ritual or Revelation? The conference will be held from 29 June to 1 July 1988 at St Michael's Grammar School, St Kilda, Melbourne. While there will be some dissemination of information about current research, the main purpose of the conference is to discuss the application of educational models and techniques to various aspects of computer use in schools.

Invited speakers who represent different positions in the debate will speak on the issues that they see as being most important. As well as considering the present situation, speakers will be asked to speculate about future possibilities and implications.

The conference fee of \$120 includes dinner on 29 June, lunches, and a copy of the proceedings. All inquiries should be made to Ms Liddy Nevile at ACER (PO Box 210, Hawthorn, Victoria, 3122; phone 03-819 1400).

Reports from the Institutes for Educational Research

The Institutes sponsor programs of seminars, workshops, panel discussions, and lectures on educational matters and issues of current interest.

Further information about membership and the current program of the Institute for Educational Research in your state can be obtained from the state secretary. Contact name and address can be obtained by telephoning or writing to the Editor of *ACER Newsletter*.

SEMINAR ON INTELLIGENCE



Melbourne, Australia
24 to 26 August 1988

This seminar is of international significance, and the program will feature two symposia and numerous sessions and workshops. Symposium speakers include:

Professor Earl C. Butterfield (USA)
Professor John B. Carroll (USA)
Professor Arthur J. Cropley
(West Germany)
Dr John P. Das (Canada)
Professor Andrea A. Di Sessa (USA)
Dr Michael W. Eysenck (UK)
Professor Robert Glaser (USA)
Professor John L. Horn (USA)
Professor Rainer H. Kluwe
(West Germany)
Professor James W. Pellegrino (USA)
Professor Kjell Raaheim (Norway)
Professor Marc N. Richelle (France)
Dr Helga A. H. Rowe (Australia)
Dr Lazar L. Stankov (Australia)
Professor Robert J. Sternberg (USA)

Registration forms are available from Mrs Yvonne Allen, the Secretary of the Planning Committee at ACER on (03) 819 1400.

AASE Conference

The Australian Association of Special Education will hold its 13th Annual Conference – Living and Learning Together – in Sydney from 28 September to 2 October 1988.

Inquiries and expressions of interest should be directed to Judy Eppinger at ACER or the Convenor, Warren Fairfax, NSW Chapter of ASE, PO Box 6000, Parramatta, 2150, telephone (02) 633 0400.



The Australian Education Index – the AEI – celebrated its 30th birthday during 1987. To mark the anniversary, all past librarians-in-charge of the Australian Council for Educational Research and others who have worked on production of the AEI over the past thirty years were invited to a reunion during

Library Week. The photograph shows the previous and current editors of the Australian Education Index – (left to right) Catherine Gigante (Dwyer), Elspeth Miller, Elizabeth Oley, Julie Badger, Frances McPherson (Amor), and Mary Carrick.

National Guide to Literacy Project

Graeme Withers, Senior Research Officer at ACER, has been seconded to the Curriculum Development Centre (CDC) to design in detail the National Guide to Literacy Project and to work with state liaison personnel and CDC staff on the collection of materials.

The aim of the National Guide to Literacy Project is seen as building on the work of earlier programs which had improved teaching skills and emphasized the need for effective monitoring of children's progress in reading and writing. The new project will complement the earlier work by providing criteria for the assessment of literacy at different levels of schooling. It will also aim at showing teachers, by means of commentaries on student work, how the criteria were achieved and how they might form the basis of further curriculum development and classroom practice. It is intended to yield a document, primarily written for teachers, that will act as a guide and resource for the learning, teaching, and assessment of those literacy skills that are commonly perceived as being necessary for effective participation in Australian society.

How Will the Project Proceed?

The essence of the project is direct participation by all the major education systems in collaboration. State liaison officers will work with project staff on the collation of various contributions to the project. These activities will include:

- provision and annotation of docu-

mentation relating to recent and present state initiatives in literacy development;

- setting up networks of teachers and others who are interested in assisting the project;
- locating and contacting teachers who are known to be exemplary practitioners, and arranging for school visits;
- assisting with the collection, selection, and annotation of student work derived from classroom activities, which will form the texts on which the final report is based;
- assisting with the design and trial implementation of curriculum and assessment strategies arising from the project that are seen as exemplary;
- assisting with the design and trial implementation of any teacher development procedures that might usefully complement the project;
- provide the education systems with advice about the implementation of curriculum and teacher development proposals yielded by the project.

Address for the Project

Further inquiries and expressions of interest can be made directly to Graeme Withers at ACER (PO Box 210, Hawthorn, Victoria, 3122; phone 03-819 1400).

ACER's Psychological Test Bulletin

The *Psychological Test Bulletin* (formerly the *Bulletin for Psychologists*) is the only periodical in Australia dealing ex-

clusively with psychological tests. Each issue includes independent test reviews, research reports and other articles on testing, Australian norms, and descriptive information on new tests.

Most psychological tests used in Australia have been developed overseas – usually in the United States of America or Great Britain. Research data and other information on their use in Australia are therefore of vital importance to local users in education, industry, health and community services, counselling, and research.

The *Psychological Test Bulletin* is edited by Dr Jo Jenkinson and published twice each year by ACER. Subscription rates are \$25 (Australian residents), \$30 (overseas, surface mail), and \$35 (overseas, air mail).

Subscriptions (Australian currency) should be addressed to ACER Psychological Test Bulletin, ACER, PO Box 210, Hawthorn, Victoria, 3122.

Publications from Overseas

All books from the New Zealand Council for Educational Research (NZCER) and the National Foundation for Educational Research in England and Wales (NFER) are available from ACER. Ordering information and further details of publications are available from Consultant Services Division. Readers in New Zealand and the United Kingdom should go direct to the organization in their own country.

Positive School Discipline: A Practical Guide to Developing Policy

M. Cowin, L. Freeman, A. Farmer, M. James, A. Drent, and R. Arthur

Parents and Friends of Monnington Publications

An excellent resource written by school counsellors representing their collective knowledge and accumulated experience.

The book is written in three sections. The first is highly structured and identifies 21 steps to be taken in reviewing and developing a school's discipline policy. The second section provides a number of short articles to assist in the understanding of how to implement the 21 steps, and the third part contains an extensive list of relevant resources and references.

An essential reference for primary and secondary teachers, school councils, curriculum committees, welfare coordinators, consultants, and regional boards.

Code 244BK Price \$25.00

PT/GT for Parents and Teachers of Gifted and Talented Children

American Guidance Service, 1987

A comprehensive program for parents and teachers of five sessions aimed at fostering the development of gifted children. Focused sessions will help participants in this program learn to:

- recognize the special characteristics and needs of gifted children;
- foster a healthy self-concept, independent thinking, and a creative attitude toward life;
- recognize, develop, and encourage creativity;
- ask challenging questions that lead to complex thinking and problem solving;
- become advocates for the needs of high-potential children.

Included with the program is a leader's guide, teacher's and parent's resource books, as well as an activity file of 52 resource cards.

Further details are available from ACER Consultant Services Division.

| | Code | Price |
|--------------------------------|-------|----------|
| Complete program | 990DQ | \$246.00 |
| Parent's participant's packet | 701DQ | \$36.00 |
| Teacher's participant's packet | 700DQ | \$36.00 |

April 1988

NEW FROM A·C·E·R

Body Rights: A DUSO Approach to Preventing Sexual Abuse of Children

American Guidance Service, 1987

The Body Rights program offers a positive way to teach children from pre-school to Year 2 and special needs students about self-protection. This effective new program reflects the philosophy and principles of DUSO (Developing Understanding of Self and Others). Many Australian schools use the DUSO program to develop self-esteem, social awareness, and problem-solving abilities. Body Rights teaches children the assertiveness and decision-making skills necessary to protect themselves from sexual abuse.

Body Rights provides all the materials required to teach about sexual abuse prevention – a comprehensive curriculum filled with activities that appeal to children and easy-to-follow instructions. Further details are available from ACER Consultant Services Division.

Code 990QAB Price \$246.00

School and Disability: Research and Practice in Integration

(Australian Education Review No. 26)

Josephine Jenkinson

This review draws on a wide range of literature, both from Australia and from overseas, in order to identify important issues in the integration of disabled children into regular schools.

A major contribution of the review is an extensive critique of the research, which has been used in an effort to resolve the integration-segregation debate. Problems in the application of traditional research methodology to the realities of special education are discussed, and some alternative approaches, including descriptive studies of existing integration programs, are presented.

Code 222BK Price \$8.95

Best of set: Assessment

NZCER/ACER 1988

This timely package of selected assessment articles from the past seven years of *set*, plus a review article written by Dr Barry McGaw, Director of ACER and leading researcher in the field of assessment, will be a most worthwhile resource for everyone in education.

The total of 14 items will make a valuable reference collection, ideal for school-based assessment planning and for in-service education for teachers.

The article 'Overview of Issues in School Assessment' by Barry McGaw discusses the purpose, quality, form, and content of assessment. Various approaches to aggregating or summarizing results are considered, and professional obligations in assessment outlined. The fundamentals of item response theory are covered because this technique offers an integration of criterion-referenced and norm-referenced assessment.

Code 988BS Price \$10.00

Best of set: Reading is also available
Code 985BS Price \$7.00

Neale Analysis of Reading Ability – Revised

Marie D. Neale

The revised edition of the Neale Analysis will be released in April 1988. The revised edition consists of a manual, a test booklet, and record sheets including a diagnostic tutor sheet. The passages have been either revised or replaced, and the detailed manual includes recommendations for helping children overcome reading problems. Australian data are available, presented as percentile ranks, stanines, and age norms.

| | Code | Price |
|-----------------------|-------|---------|
| Test Booklet – Reader | 100CV | \$18.95 |
| Individual Records | | |
| Form 1 | 600CV | .80 |
| Form 2 | 601CV | .80 |
| Diagnostic Tutor | 602CV | .80 |
| Manual | 500CV | \$20.00 |
| Specimen set | 000CV | \$40.00 |

English Language in Australian Schools: Towards a Practical Framework

(Australian Education Review No. 27)

Kevin Piper

This review brings together the results of a number of major research projects conducted over the past decade and explores their implications for the

development of a practical framework for English language education in the junior secondary school. The framework incorporates the perceived priorities of teachers, students, parents, employers, and professional linguists and relates them to current practice in English language teaching and to recent initiatives in curriculum development.

The review should be of interest to practising teachers, curriculum developers, and to all those concerned with this vital aspect of Australian education.

Code 242BK Price \$8.95

Philanthropic Trusts in Australia (Fifth Edition)

The number of trusts included in this edition is 275, including 12 with their principal offices outside Australia. Individuals or organizations seeking funds for various projects will find the latest edition a valuable resource.

This edition of *Philanthropic Trusts in Australia* is published by the ACER for the Association of Australian Philanthropic Trusts.

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- ACER Educational Resource Materials Catalogue 1987/88 for Secondary Schools (contains descriptions and prices of resource kits suitable for pastoral care programs in secondary schools)
- ACER Educational Resource Materials Catalogue 1987/88 for Pre- and Primary Schools (contains descriptions and prices of resource kits suitable for social development programs)
- ACER Parent Education Catalogue (contains details about books and parent education programs)
- ACER New Psychological Tests 1988 (a supplement to the ACER Psychological Catalogue; available only to guidance officers and psychologists)

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