No. 57 July 1986

A·C·E·R NEWSLETTER

Edited by Peter Jeffery and John King

Taking Maths in Year 12

About the study

This investigation was promoted by a concern of the Institution of Engineers, Australia, that there has been an apparent decline in participation in advanced Maths courses in Year 12 and that this was likely to have far-reaching implications for entry to technological and scientific occupations. Specifically, the main questions addressed by the project were:

- What factors influence a young person to take Maths in Year 12?
- Why is there a relatively low participation rate in advanced Maths in Year 12 and why is this more pronounced for females?

A review of the literature provided evidence of the important influences on achievement and participation in Maths. Much of the literature has been concerned with differences between males and females in achievement in Maths in both the early and final years of school.

Studies more concerned with investigating participation in Maths have noted influences such as a student's liking for Maths or enjoyment in doing Maths; general subject and career preferences; attitudes, for example 'Maths as male domain', 'Maths anxiety', 'usefulness of Maths', 'Maths for a career'; and parents and teachers as sources of encouragement and role models. Environmental influences on participation in Maths in the senior school years has received little attention. Mostly they have been linked to staying on to Year 12 rather than in specific subject areas. These influences include the type of school attended; the location of the school; class size; and sex composition of the school.

Theoretical model

The main research questions were investigated through a theoretical model of participation in Maths in Year 12. The model causally linked those factors reported to be important influences on participation. In other words, early school experiences and achievements were seen to have a direct effect on attitudes to Maths in the middle and senior school years and, in turn, upon the decision to continue (or not) with Maths in Year 12. Similarly, the influence of teachers, parents and the school in the middle school years (around Year 10) would have an effect on attitudes in Year 12 and the final Year 12 decision. Most importantly, a young person's aspirations to undertake post-secondary studies and the provision of a range of subjects at Year 12 by the school were also seen as having an influence on decisions about Maths in Year 12.

Collecting and analysing the data

Data were obtained from two sources, the Second International Association for the Evaluation of Educational Achievement (IEA) Mathematics Study (conducted in Australia by the ACER in 1978), and postal questionnaires (administered initially between December 1983 and January 1984 to the same students who were involved in the 1978 Mathematics Study). A total of 5324 13-year-olds were tested in the 1978 study and followed up in 1983/84 as 18-years-olds. The final achieved sample was 3279 cases, or 62 per cent of the total sample.

The survey yielded two distinct subsamples: those who had completed—or who were about to complete—Year 12, and those who had left school before Year 12.

Basically, the approach taken in analysing the data was to sequentially examine first the overall effects, using cross-tabulations, and then the direct net or unique effects, using multiple linear regression, of all influences on each of the criteria—to take Maths or not and to take advanced or ordinary Maths—and describe the magnitude of those effects. In the process, the model was continually refined so as to produce the most parsimonious model of participation in Maths in Year 12.

The first term of reference: what affects the decision to take Maths in Year 12?

Overall, participation in Maths in Year 12 differed considerably between the States. In the ACT, NSW, Queensland, and Western Australia, of those who had continued to Year 12, over 95 per cent had taken at least one Maths subject. In Victoria, South Australia, and Tasmania the proportions were considerably lower. In the ACT, NSW, Queensland, and Western Australia females were slightly less likely than males to have taken Maths in Year 12. For Victoria, South Australia, and Tasmania the ratio of males to females who had taken at least one Maths subject in Year 12 was of the order of three to two. These strong state differences persisted through all stages and levels of analysis. These differences are no doubt due to differences in

ACER Publications

Bibliography of Education Theses in Australia: a list of theses accepted for higher degrees at Australian universities and colleges. Hawthorn, Victoria, ACER Annual Publication 1978, 1979, 1984.

Australian Education Index, Volume 29, Number 1, March 1986.

Australian Education Review, Number 23, 'Australia's International Relations in Education'. Phillip W. Jones.

STEP/Teen—The Parent's Guide. D. Dinkmeyer & G.D. McKay.

Australian Journal of Education, Volume 30, Number 1, April 1986.

ACER Current Projects 1985–1986.

set: research information for teachers, Number 1, 1986.

Non-verbal Ability Tests (NAT), Monograph, 1986.

educational systems at the secondary school and to some extent to the perceived appropriateness of Maths as a subject area in Year 12.

Just over half of those who had continued to Year 12 had made their decision about their Year 12 subjects by the time they had completed Year 10. A further 43 per cent made that decision when they were in Year 11 and the remainder—around three per cent—had delayed their Year 12 subjects decision until they had just started Year 12.

When asked to indicate the single factor which had the strongest effect on the decision to take Maths or not in Year 12 the reason given most commonly was 'I enjoyed doing Maths at school.'

The final model of participation in Maths in Year 12, which used multiple linear regression, included influences from all three 'levels' of schooling. The early-school influences found to have a noticeable direct net effect were sex, state, and achievement.

Those affective influences found to have a noticeable direct net effect on the decision to take a Maths subject—Year 12 were: positive self-concept of ability in Maths in Year 10; encouragement from teachers and parents at the time of making decisions about Year 12 subjects; the belief that taking Maths in Year 12 helped to get a good final total Year 12 mark, a good job, and that it was important for future courses; and the enjoyment of doing Maths at school.

The second term of reference: what affects the decision to take advanced Maths in Year 12?

Overall, there were very large differences between males and females in the proportions who had completed advanced Maths in Year 12. Nationally, 40 per cent of males who had taken Maths in Year 12 had elected to take an advanced course: for females the proportion was only 20 per cent.

This finding, that approximately twice the proportion of males to females had completed advanced Maths, was not consistent in all the states. In the ACT the ratio was about five to four, in Western Australia it was around four to one.

Those young people who had taken an ordinary level Maths in Year 12, on average had a significantly lower level of achievement than the advanced group. Also, no real differences were found between males and females in their average Maths and word knowledge achievement scores either at a time in the early school years or in Year 12.

The final model of participation in advanced Maths classes in Year 12 incorporated in a multivariate analysis influences from the early-school, Year 10 and the senior school level found to have an overall or gross effect on the probability of having taken advanced Maths. When all other influences had been controlled for statistically, females were still far less likely than males to have taken an advanced Maths course in Year 12. Differences between States in participation in advanced Maths were still significant.

Student attitudes in the early school years remained as effective direct influences on participation when the confounding influence of other factors was held constant. Those who, in their early school years, had enjoyed school and thought that 'man could control his environment' were more likely to have taken advanced Maths. Self-concept of ability in Maths in Year 10 had a strong direct net effect on participation in advanced Maths as did support and encouragement from parents and the enjoyment of Maths as a subject in Year 10.

Only two affective influences in the senior school years had a direct net or unique effect on participation in advanced Maths. These related to the importance of Maths for a future course and the freedom of subject choice for Year 12.

As was expected, achievement in Maths in the early school years had a significant direct net effect on participation in advanced Maths.

Targeting policies to improve participation

This study has shown that participation is affected by a number of factors at a number of points in time. Compulsory Maths courses at the senior school level obviously raises overall participation but does little to enhance a young person's self-concept in, or liking for the subject. Both these affective behaviours were found to be important influences on participation. Hence, it would seem more appropriate to direct attention towards facilitating changes in these attitudes in the early and middle years of school. Given the comments made by young people—particularly those who had left school before Year 12—serious thought needs to be given to the content of Maths subjects for the average ability students in terms of its practical use in everyday life.

This study found that the influence of parents and teachers in the form of encouragement and support affected participation in Maths, much more so than the style of teaching used in Maths classes in the early or middle school years, although early school leavers were more inclined than those who went on to Year 12 to believe that the best Maths students got most of the teacher's attention. A more supportive environment for the less able Maths students would most likely enhance participation and self-concept.

Although teachers as role models have been shown to have a noticeable affect on subject and career decisions and self-concept, this was not addressed to any great extent in this investigation.

Clear career goals obviously affect decisions about subject combinations and subject levels. The question remains as to whether young people are seriously disadvantaged by delaying career choices until the end of Year 12. For specialized career areas, which rely on a substantial understanding and use of Maths, educational and career guidance in the middle school years would seem to be most appropriate.

A draft report titled 'Secondary School Mathematics & Technological Careers' has been prepared and is being revised. A final report will be published in late 1986.

Enquiries should be directed to the author, Warren Jones, Senior Research Officer, ACER.

SISS

The aim of the Second International Science Study (SISS) is to provide a comprehensive picture of science education across the world. Science tests and questionnaires have been administered to students in 26 education systems at the upper primary (10-year-olds), lower secondary (14-year-olds) and upper secondary (Year 12) levels. As well as *describing* differences across the education systems, the study seeks to find *reasons* for the differences.

The study is being conducted under the auspices of the International Association for the Evaluation of Educational Achievement (IEA).

A·C·E·R NEWSLETTER

Sex Differences in Access and Use of Computers

Malcolm Rosier and Heather Payne

During the last few years most schools in Australia have purchased computers, often in response to parental and community pressure. The message being presented by the media to students and their parents is that this is the 'information age'. Young people entering the workforce or participating in further education will be disadvantaged if they cannot use computers.

The opportunity to examine students' use of computers for learning science has arisen as part of the Second International Science Study. Australia is one of 26 educational systems in the study, which is investigating many aspects of science education. A wide range of data was collected for the study, including information about the science curriculum, classroom practices, attitudes to science, and students' achievement. The data also included a description of the students' background, and of their science teachers and the schools they attend.

The information in this article is based on data collected from a large sample of Australian 14-year-old students in Years 8–10 in 1983 (*see* under SISS). The questionnaires answered by the students included three questions related to computers:

1 Are there any computers at your school?
2 How much time each week do you spend using a computer at school?
3 Is there a computer in your home?

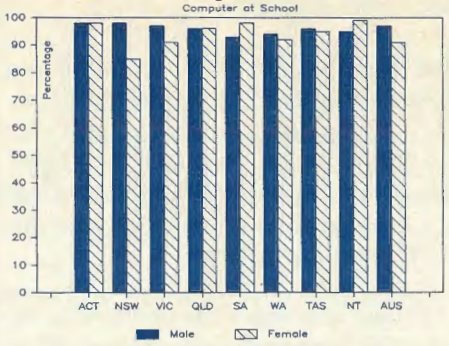
Computers at school

Previous studies have shown that boys are generally the major computer users in schools, whether as enthusiasts (such as computer 'hackers' or computer club members), or as the more active users on terminals during lessons. Girls often look on passively in classes where several students work together at one terminal.

This article presents the data on provision and use of computers separately for boys and girls, to show that these observations also apply in Australia.

Figure 1 shows the responses of boys and girls to question 1, 'Are there any computers at your school?'

Figure 1
Computer at School



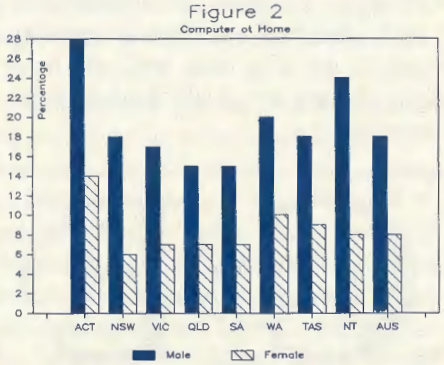
The figure shows the high level of penetration of computers in schools in all States in Australia in 1983. Overall only 4 per cent of students stated that there were no computers at their school. In the Australian Capital Territory, Queensland, and the Northern Territory there are virtually no differences in the percentages for boys and girls, but in New South Wales 13 per cent fewer girls stated that there were computers in their school. Smaller differences occurred in Victoria and South Australia. In South Australia the trend is reversed; more girls than boys stated that there were computers at their school.

One suggested explanation for the sex differences was that fewer girls perceived that there were computers in their schools. This idea was investigated. Students in each school who responded differently from the majority of the students at that school were identified as having 'misperceptions'. The percentage of misperceptions was less than 2 per cent, and there were no significant sex differences in misperceptions. A more detailed examination of the data then revealed that the observed sex differences were mainly due to the absence of computers in some single sex schools.

Computers at home

Figure 2 shows the percentage of girls and boys with a computer in their home. In this case the sex differences are rather dramatic. In every State a smaller percentage of the girls have a computer in their home. The size of the difference ranges from 8 per cent in South Australia to 16 per cent in the Northern Territory. In general terms, the percentage of boys with access to computers at home is twice as great as the percentage of girls.

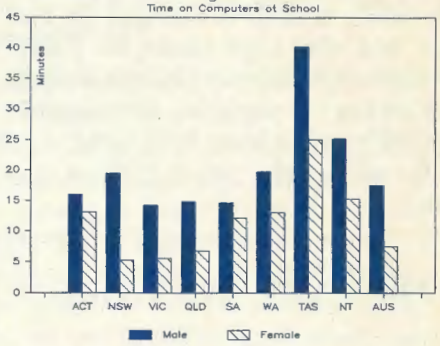
Figure 2
Computer at Home



Use of computers

The results presented so far refer to students' access to computers. Some estimates are available of the amount of time spent using computers at school. Figure 3 shows the mean number of minutes each week spent by boys and girls on using a computer at school.

Figure 3
Time on Computers at School



Tasmania clearly has the highest level of student use of computers. Perhaps the relatively long and centralized involvement in computing at a state level is reflected in these data. Tasmania's smaller population may also make it easier to implement policies and decisions about computing facilities at the state level. In each State, boys use computers more than girls. The data for Australia overall show that the mean time spent using a computer in school is 18 minutes per week for boys and 8 minutes per week for girls. In other words girls are using computers less than half as much as boys. These data support the view that boys are the major users of school computers.

It has been suggested that appropriate use of computers will enhance students' higher cognitive abilities such as problem solving and decision making. If girls make less use of computers than boys, at school and at home, these differences will contribute to sex differences in higher cognitive abilities. Research, software development, and teacher training are needed before 'appropriate' uses for computers can be identified and implemented.

In addition, the issue of equal opportunity for boys and girls needs to be addressed. Girls do not have to be disadvantaged in their access to computers and the use they make of them. However, the results presented in this article indicate the magnitude of the problem facing those who would like to change the situation.

New Computer Facility

ACER has installed a large new computer system to support its research and other operations. The Microvax system was purchased with the assistance of the Commonwealth and State Governments plus monies from ACER's own resources. Apart from data manipulations for research projects the equipment is being used for word processing and it supports the Optical Mark Reading services used by projects (such as in norming) and for testing services for schools and other clients.

The acquisition of this advanced system enhances the opportunities for ACER to conduct research and provide effective services across the wide range of interests of the Council.

Visitor from Papua New Guinea

Mr Godfrey Yerua of the Papua New Guinea Education Department's Measurement Services Unit has been attached to ACER for a period of three months to gain experience in development and evaluation of test instruments. The attachment was part of his associate directorship training program. It is anticipated that, at the end of this year, he will become Director of the Measurement Services Unit, Ministry of Education, Papua New Guinea.

Mr Godfrey Yerua working with Mr George Morgan, Senior Research Officer

AEI User Courses

The ACER library announced *Australian Education Index* (AEI) user courses in a separate brochure mailed with the last *ACER Newsletter*. Interest in the courses has been pleasing and the library has contacted respondents with further details. The initial full-day course was held on 17 July in the second floor seminar room of the Ballieu Library at the University of Melbourne.

As interest has been shown in other capital cities it is hoped that courses can be scheduled outside Melbourne as well. A day course is also planned during the week of 15 September in Brisbane. Details and dates of further courses will be included in future newsletters.

The course will be aimed at current or potential *Australian Education Index* users. It is designed to enhance database search strategies by giving an analysis of the data file and record structure, an overview of the historical changes of the file, the types of material and subjects covered, and indexing techniques employed. A new database user's manual will be given to those attending.

AEI subject scope is extensive, including all available Australian materials in education, library, and information science as well as related fields of psychology, sociology, administration, training, labour economics, and the social and behavioural sciences. AEI's coverage has altered over the years, reflecting the developments in the literature and research. Issues such as youth unemployment are covered from their social, economic, and psychological perspectives, not simply from their educational perspective. This same trend is also evidence with other subjects.

For further details please contact Elspeth Miller or Elizabeth Oley, ACER Library or telephone (03) 819 1400.

Strengthening Stepfamilies Program

Late in 1986, ACER will be introducing a new parent education program from the American Guidance Service whose programs, STEP, STEP/Teen and Responsive Parenting are already widely used in Australia. It is hoped that this program, Strengthening Stepfamilies, will help address the complex and very different issues faced by stepfamilies.

In Australia, one third of all marriages are remarriages, with 35,000 children entering a stepfamily every year. Stepfamilies are structurally different from nuclear families and face complex issues such as unresolved grieving, the disciplining of non-biological children, access and custodial parenting, the need to develop the couple's relationship, the question of an 'ours' baby, relationships between stepchildren, and often financial and legal problems.

Strengthening Stepfamilies is a 5-session program which provides stepparents with an understanding of the differences between their kind of family and a nuclear family; with information which encourages realistic expectations; and with support and encouragement.

The authors of the program are Elizabeth Einstein and Linda Albert. Elizabeth Einstein is herself both a stepchild and a stepmother. She is a member of the Stepfamily Association of America, founding editor of the *Stepfamily Bulletin* and author of the book, *The Stepfamily: Living, Loving, and Learning*. Linda Albert is Director of the Family Education Centre in Florida and author of two books, *Linda Albert's Advice for Coping with Kids* and *Coping with Kids and School*. Both authors have frequently led workshops on stepfamily living.

Included in the Strengthening Stepfamilies Kit is a *Leader's Guide*, a *Participant's Handbook*, a Stepfamily Encouragement Packet with home activities for the whole family, three Audiocassettes of dramatic vignettes, Review Charts, and Blackline Masters of additional activities.

Enquiries about the Strengthening Stepfamilies program should be directed to ACER, PO Box 210, Hawthorn, Victoria 3122. Telephone: 819 1400, or toll-free outside Melbourne, (008) 338 402.

Curriculum Reform in Western Samoa

The Western Samoa Junior Secondary Curriculum Project was established in 1985 to review and redevelop the curriculum for the Junior High Schools (Forms 3 to 5) so that it will better reflect the needs and aspirations of Samoan society and expand the educational opportunities of Western Samoan children. The project is sponsored by the Australian Development Assistance Bureau (ADAB) in conjunction with the government of Western Samoa. ACER is supporting the project through the involvement of Kevin Piper as a member of a team of Australian consultants working with the members of the newly-formed Western Samoan Curriculum Development Unit on the development of the revised curriculum. Kevin's role on the team is as a general curriculum consultant with particular responsibility for advice on assessment and evaluation.

Many influences have helped to shape present-day education in Western Samoa: indigenous Samoan culture; the effects of nineteenth century Christian missionaries; twentieth century colonialism, initially as a German colony and, after World War I, as a Trust Territory administered by New Zealand; and the aspirations of Western Samoan educators who have controlled schooling since the islands attained independence in 1962, the first Polynesian nation to do so. Since independence the task of expanding educational opportunity has proved somewhat easier than that of fostering the curriculum to meet Samoan needs. Shortly after independence Samoan language and culture were added to the New Zealand-patterned curriculum at all grade levels, and efforts were made to insert more practical vocational subjects, particularly in the secondary schools. Despite these efforts, however, the bulk of the programs, particularly at the secondary level, still closely resemble those of the pre-1962 era, principally because New Zealand examinations continue to be used as criteria for determining the success of students at the secondary level. The New Zealand School Certificate Examination is used as a basis for selecting those Form 5 students who will move on to upper secondary school, while the New Zealand University Entrance Examination is used to determine which students will move on to higher education. The scheduled withdrawal of these New Zealand provisions in 1989 has created the opportunity and the impetus for the reform of the junior secondary curriculum, and set the agenda for the project.

During the late 1970s and early 1980s members of the staff of Macquarie University were involved in an ADAB-sponsored project to review and revise the Western Samoan primary school curriculum. In 1980, in conjunction with these developments, a decision was made to reduce the fourteen year school sequence inherited from pre-independence days to a thirteen year sequence comprising an eight year primary sequence, made up of a three year lower primary segment (classes 1 to 3), a three year middle primary segment (classes 4 to 6), and a two year upper primary segment (forms 1 and 2); and a five year secondary sequence, comprising a three year junior secondary segment (forms 3 to 5), and a two year upper secondary segment (forms 6 and 7).

From 1981 onwards negotiations between the Western Samoan government and ADAB led to the setting up of the Western Samoan Junior Secondary Curriculum Project in 1985. The proposal for the revised curriculum for the Junior High Schools provides for the development of programs in six broad curriculum areas: Language Arts, Mathematical Studies, Social Education, Environmental Education, Practical Arts, and Expressive Arts. Underlying the development of the programs are four key processes: inquiry, communication, acting co-operatively and independently, and expressing self-creativity.

Ambiguity and ambivalence underlie the move towards curriculum reform in Western Samoa. On the one hand there is a desire to preserve the rich and complex Samoan culture and the language which sustains it and is sustained by it; on the other the pressing need for economic development, and the consequent demand for advanced skills and a language of communications with the outside world. It is the tension created by these deeply felt and often conflicting aims which constitutes the challenge underlying the Western Samoan Junior Secondary Curriculum Project. Three issues have emerged as dominant in the process of review and redevelopment: the language of instruction; certification and selection; and the urgency of the timelines imposed by the withdrawal of the New Zealand School Certificate Examination in 1989.

The language of instruction in the secondary schools has traditionally been English, partly because of the influence of the New Zealand examinations, and partly because proficiency in English is seen as important to development. With the opening up of junior secondary education to all Samoan children, however, concerns have been raised about the effects on Samoan education of instruction in a second language in which competence varies widely, particularly in rural areas. A decision has been reached to see as a major aim of the junior secondary curriculum the development of bilingual students proficient in both Samoan and English. However, the precise application of this policy—in the development of student materials, for example—continues to be a major source of both headache and heartache for the members of the curriculum development team.

Issues of certification and selection continue to be a major source of concern for a country in which opportunities for further education are few and tied in to the requirements of overseas institutions. There is a widespread concern that in adapting the curriculum to Samoan needs, it should not cut off the more able students from the limited opportunities available to them. At the same time, there is an acute awareness that certification and selection procedures should not be allowed to distort the emphases of the revised curriculum and undermine its purposes.

The withdrawal of the New Zealand School Certificate Examination in 1989 means that the revised curriculum for Form 3 must be in place by next year, with Form 4 to follow in 1988, and Form 5 in 1989. By 1989, too, a new Western Samoan School Certificate must be in place and an examination devised which will reflect the purposes and principles of the new curriculum. From an Australian perspective such a timeline would certainly seem undesirable. Indeed, it may well seem impossible, particularly given the limited resources available to the Curriculum Development Unit. For the Samoan team, however, it is a necessity, and underlines the sense of urgency and commitment which surrounds the project.

The role of the Australian consultants is seen as being advisory only. As the majority of the CDU team have been appointed directly from classrooms, there has been some perceived need for workshops on the general principles of curriculum

design and development, materials production, and assessment and evaluation. The main task however is to work with the Samoan team in helping them to achieve their goals and aspirations. In the words of a Samoan saying quoted by Mrs Gaufa Vesele, the director of the CDU: *'Va tatou maea e tasi'*. Which is to say: 'We are, by the nature of the undertaking, roped together in it.'

What SCOPE!

ACER has successfully tendered for the Student Choice of Occupations and Paths in Education (SCOPE) survey for June 1986. The survey will collect career and curriculum information from Victorian secondary students in Years 10, 11, and 12, and their equivalents in TAFE colleges. An estimated 120,000 students are expected to participate in the survey. ACER's Optical Mark Reading Services will demonstrate the SCOPE it can offer.

1986 AARE Conference

Andy Sturman, a Senior Research Officer at the ACER, is a member of the 1986 AARE Conference Committee. The Conference will be held in Melbourne from 18–21 November 1986 and its theme is 'Theory, Structure, and Action in Education'. For further information contact John Anwyl at the Centre for Research into Higher Education, University of Melbourne, telephone (03) 344 6313.

ACER Annotated Catalogue

The NSW Guidance Branch has purchased 700 copies of the new ACER Annotated Catalogue of Educational Tests and Materials for distribution to guidance staff throughout New South Wales. The Annotated Catalogue gives details of the testing and teaching resources available to teachers for use in schools. The catalogue is available at $7.

set Set Again

The latest edition of *set: research information for teachers* (No. 1986 Part 1) has now been published. Subscribers who are on the list have had their *set* mailed directly to them from New Zealand since this material is a joint publication of the ACER and the NZCER.

People who renew late or who wish to subscribe to *set* now can do so but their *set* will be posted from ACER in a few weeks. The *set* 1986 subscription rate is $18.00 for the two parts.

A limited number of *set*, above the known subscription list, has been produced but we recommend that anyone contemplating taking out a subscription at this late stage do so promptly.

Work has begun on the second issue of *set* for 1986. This will be published in October this year. As this issue is being put together consideration will be given to the topics in research which most concern teachers throughout the Commonwealth. ACER maintains a file of comments sent by subscribers and others regarding the topics which are causing concern. If you would like to suggest topics which could be addressed in *set* you are welcome to do so. Please write to editor of *set*, at the address on this newsletter.

One aspect of *set* which is troublesome at present is that we do not have quite as large a flow of Australian research material as one would expect given the size of the Australian educational academic community. I hope researchers and others working with educational research findings who read this will consider making a contribution to *set*. Send contributions to either the editor in Australia at ACER or to the *set* editor in New Zealand at the New Zealand Council for Educational Research in Wellington. Syntheses of research emphasizing practical outcomes for teaching situations are also most welcome from people who are not actually doing research themselves.

ACER International Seminar on Intelligence

Date Wednesday 24 August 1988—Friday 26 August 1988, Melbourne.

Aim To analyse, integrate, and disseminate some of the most promising recent findings and approaches resulting from research related to the concept of intelligence and its improvement.

Plan The seminar will commence with a public lecture on the evening of Wednesday 24 August 1988, and will finish on Friday 26 August 1988. Symposia will be held on both mornings, and the afternoons will contain concurrent sessions.

The *symposia* will offer a number of persons, who reflect current approaches which have significantly contributed to existing knowledge, an opportunity to discuss their work in relatively broad perspective, and to consider explicitly how their findings and the knowledge they have gained could be brought to bear upon the development of more general theories, and upon approaches towards the solution of practical problems. Speakers will be asked to speculate about future developments.

The *sessions* will present a sample of short reports of current research and practice in the field. Papers will be up-to-date with regard to theoretical and technical developments, yet understandable for the non-specialist. Some sessions will be designed to foster debate between researchers and practitioners, others to establish connections between researchers and/or practitioners in different disciplines.

Dr Helga A.H. Rowe, Chief Research Officer, ACER, is the Chairperson of the Planning Committee. Further enquiries should be directed to Roma Peele, Secretary, on (03) 819 1400.