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RESEARCH DEVELOPMENTS

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No. 16 Summer 2006

Australian Certificate of Education: Exploring a way forward

Standards for school leadership

Pathways to literacy

Improving science learning

Principal for a Day program

Australian Council for Educational Research

ACER

An Australian Certificate of Education



Professor Geoff Masters
Chief Executive Officer

*Welcome to the 16th edition
of Research Developments.*

*This issue features an article
on a study ACER led to examine and
report on options for a single national
Year 12 certificate – an Australian
Certificate of Education. Australia
currently has nine different senior
secondary certificates (ten if
the International Baccalaureate
Diploma is included).*

In addition we have a baffling range of assessment and reporting arrangements making it impossible to make meaningful comparisons between certificates. This situation creates confusion and difficulties for students who move between states and for employers trying to compare the qualifications of prospective employees. Australia needs greater consistency in reporting Year 12 results.

It's also time for a national debate on what Australian students should be learning in the final years of secondary school, regardless of where they live. A separate study to examine the content, curriculum and standards of senior school subjects across Australia in English, mathematics, physics, chemistry and Australian history is nearing completion and will report by the end of the year. It will hopefully contribute to this much needed debate.

ACER's annual Research Conference, held in Canberra in August, considered issues in science education in Australia.

As John Ainley writes in his article, the conference identified an urgent need for

new approaches to the teaching of science that are less focused on the memorisation of facts, that provide an understanding of the processes and human face of science, and that do a better job of connecting science to the lives of the majority of students.

This edition of *Research Developments* also describes current research in early childhood literacy and school leadership. Alison Elliott explains the importance of helping children to develop strong language and other pre-literacy skills to improve their 'readiness' to learn to read when they start school.

Lawrence Ingvarson reports on a study for Teaching Australia to review approaches to standards for prospective and established school leaders and options for a national system for assessment.

I hope that you enjoy reading this edition of *Research Developments* and find its contents informative.

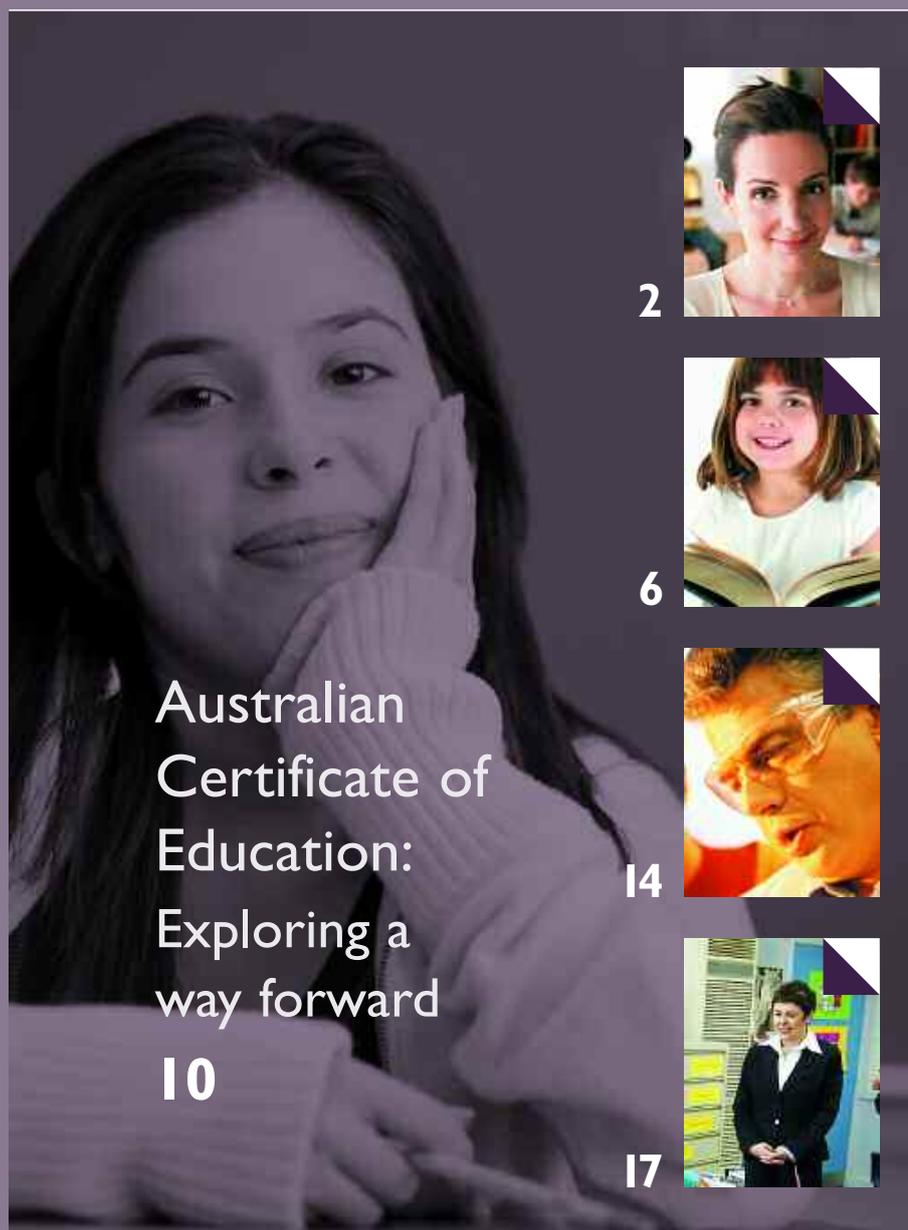
A handwritten signature in blue ink that reads "Geoff Masters". The signature is written in a cursive, flowing style.

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Standards



for school leadership



By Dr Lawrence Ingvarson

Lawrence is a Principal Research Fellow with ACER's Teaching and Leadership research program.

ACER has examined national and international developments in school leadership standards and assessment for prospective and established school leaders to assist in identifying options for a national system for assessment.

Lawrence Ingvarson explains.

In recent years, school leaders' work has been characterised by increasing complexity in expectations and greater demands for accountability. The introduction of self-managing schools has entailed the devolution or decentralisation of a number of new responsibilities to school leaders. At the same time, centralisation of curriculum control to national or state levels has often occurred, aligned with system-wide assessment and reporting of student achievement for accountability purposes. New responsibilities for principals include: managing and monitoring curriculum development, assessment and reporting; staff selection and performance management; financial management; mission building and managing reform; managing professional development; school accountability; and community relations and marketing. These additional responsibilities may be having a negative impact on the attractiveness of leadership to potential recruits.



These changes have led to calls for more and better professional preparation programs, and greater attention to programs tailored to the needs of established school principals. Expectations of what teachers and school leaders should know and be able to do change over time and context, as they do in most professions. Standards must reflect those changes. The role of standards developers is to identify what is of central importance in the preparation of school leaders – to identify those features of leadership that are associated with student outcomes. These changes have also called for more attention to be given to the recruitment and selection of suitable school principals and to conditions of work that will increase the retention of effective leaders. Standards have a role to play here also in pointing to fair and valid forms of evidence to assess the performance of school leaders.

A review of standards

ACER was commissioned by Teaching Australia to review approaches to leadership standards and identify options for a national system for assessment against school leadership standards for prospective and established school leaders. In Australia, many quality sets of standards for teachers and school leaders have been developed, but they are not profession-wide.

The review covered leadership standards and certification of two broad career levels: standards for prospective principals and standards for established principals. As a generalisation, the needs of established principals in this area are less catered for than the needs of aspiring school leaders.

The review focused on the following five standards systems, but also draws on many other examples of standards for school leadership in Australia and overseas:

- Western Australia: Performance Standards for School Leaders
- England: National Standards for Headteachers
- The Netherlands: Professional Standard for Educational Leaders in Primary Education
- Scotland: The Standard for Headship
- Connecticut, USA: Standards for School Leaders

Writers of professional standards for school leadership face a challenging task. The field lacks agreement on a definition of leadership and the knowledge base about effective leadership in schools is limited. There is a need to identify what should be common to a set of school leadership standards, or essential features of effective school leadership practices, no matter where school leaders work.

Profession-wide standards may help in setting realistic boundaries to the scope of school leaders' work and what is expected of school leaders. In this way, profession-wide standards might help to address problems relating to the intensification of school leaders' work.

Developing standards for school leadership involves three key steps. A necessary first step is to define the content of the standards, in other words what is to be assessed. Here standards developers need guiding conceptions of what leadership is – what leaders need to know and be able to do. A second step in the development of standards involves deciding how valid evidence about leadership will be gathered. A well-written standard will not be prescriptive about how it should be met. Increasingly, in the countries reviewed for this report, there is a trend toward performance-based methods such as portfolio tasks. Thirdly, identifying whether

a standard has been met also needs consideration. This process involves the development of scales and scoring rubrics, weighting different tasks and sources of evidence, identifying benchmark performances, and training assessors.

The review found four countries apart from Australia that had made concerted efforts to redesign programs for preparing and developing school leaders around standards. While none of the four international systems represents a model that could be translated to the Australian context, as a group they have provided a valuable basis on which to clarify options for the role that the profession in Australia might play in developing a national approach to standards for school leaders.

Most of the systems in the review were aware of the need to develop a professional learning 'program' that included a structured sequenced set of courses for school leaders over time. However, with some significant exceptions, this was not found to be a common practice among professional preparation programs for school leaders in Australia.

Linking standards to professional learning

It is one thing to create standards. It is quite another to ensure they become embedded in everyday thought and practice. The challenge for these systems was to identify the most effective ways to engage school leaders with those standards, especially in ways that supported and improved their practice. In other words, how to ensure school leaders take the initiative in using those standards to guide their professional learning and to receive feedback and evaluation about their practice in relation to the standards.

The common way of thinking about how to link standards to professional learning in the systems we reviewed was to develop a course, or even a set of courses.

The limitations in this approach are several. As ever with professional development, the course mode can place the teacher or school leader in a passive role with respect to their professional learning. Others are doing most of the work identifying their needs. Courses are unavoidably front end loaded. There may be plenty of valuable input, but the learning that matters most is in the back end – at the stage when people try to implement their learning in the workplace. This is when follow up support and feedback are essential if learning and implementation are to happen.

In considering options for the future relating to certification, these questions will need to be addressed:

- Which agency, or agencies, will provide certification for prospective and established school leaders who attain national professional standards?
- What forms of evidence are used to assess whether those standards have been attained? Who will develop the methods of assessment?
- Who will assess whether school leaders have attained the standards and how will they be trained to use the standards fairly and reliably?
- Who will provide the professional learning infrastructure to support candidates for certification?

Each of these questions points to areas where the profession can play a much stronger role. In a professional certification system, it is the profession that provides the certification. It is teachers and school leaders who develop the methods of assessment, who conduct the assessments, who set the standards and who provide professional learning support. From the five systems reviewed here, we conclude that if the objective is to develop and implement profession-wide standards for school leaders, the professional certification model is most likely to involve the profession at every level of operation and create the greatest sense of ownership. ■

Standards for School Leadership: A Critical Review of Literature was written by Lawrence Ingvarson, Michelle Anderson, Peter Gronn and Andrew Jackson. It is available from the Teaching Australia website at www.teachingaustralia.edu.au



Pathways to literacy



By Dr Alison Elliott

Alison is the Research Director of ACER's Early Childhood Education research program.

Alison Elliott discusses how all children, including the most vulnerable, can be given the best chance to be ready to read.

Most children are well on their way to reading independently by the end of the first year of school. How well children progress depends on their pre-requisite understandings and skills – or ‘readiness’ at school entry. The concept of ‘readiness’, although not currently popular in Australia, is central to reading.

What do we mean by being ‘ready’ to read? In the case of most Australian classrooms, ‘readiness’ – as it applies to literacy, includes the ability to speak English fluently, describe experiences, tell and retell a story, and carry out a sequence of instructions. It also includes enjoying books and ‘reading’, knowing about the structure of books, knowing colours, drawing and describing drawings, recognising and writing a word or two, classifying objects, hearing rhyming words, beginning, and ending sounds in words and differentiating between shapes, letters and words – by appearance only.

Generally, the language, auditory, visual and perceptual skills needed for reading develop in the preschool years, mostly in the home. By the start of school, most children will use increasingly complex sentence structures and vocabulary, be able to participate in conversations, ask questions, follow instructions and tell stories. They can also express spatial and positional concepts such as size, location, quantity, and time.



Many children begin school with poor listening and speaking skills and do not develop these pre-requisite or pre-literacy skills until the first year or two of school. Immature language makes it difficult to develop print knowledge and phonological awareness, which are fundamental to learning to read. The social and cognitive gap (the 'readiness gap') between children at school entry can be immense. Where children have not developed reading readiness in their family environment, the school has to be ready and able to facilitate children to develop their 'readiness' skills in the early years of school.

Language as the basis for reading

The evidence about the link between language and early literacy is clear: Children with language difficulties are at increased risk for a wide range of problems, including poor educational achievement, mental illnesses, early school leaving and a range of behavioural problems. Good language and literacy skills on the other hand lay the foundation for social, academic, personal economic, and community success.

Good language skills develop when children are in environments with rich language, interaction and attention to the world around them and its detail and nuances. Ideally, families provide these rich language environments but when they don't or even if they do and children spend significant parts of their waking hours in child care, we need to intervene.

A recent study of nearly 1000 early childhood educators found that most had noticed a distinct increase in the number of children with 'poor language skills'. Child care practitioners attributed these poor language skills to lack of interaction with parents in the home, too much

television viewing, limited at-home reading, and social isolation. These present challenges for the preschool setting and for the first years of school (Elliott & Slee, 2004; Elliott, 2006).

A disproportionate number of children with poor language skills come from vulnerable, economically disadvantaged families. By age three children from higher socio economic backgrounds have vocabularies of 12 000 words while children from lower socio economic backgrounds have about 4000 words.

Risk factors that affect language development, literacy and later school success are mothers' low educational levels, unemployment, poverty, parent mental illness, substance abuse, and high levels of family conflict. Building mothers' language and parenting skills and boosting mother-child interaction can help to improve child language outcomes above and beyond the effect of family social status.

Fluency in English language is critical. Most of us learn to read in our first or home language, but increasingly many children learn to read in their second or even third language. There is a strong evidence base for teaching reading in children's most fluent language. In reality, with hundreds of 'first' languages used by children in Australia this is not practical. Hence, it is more important than ever to develop English language fluency.

Parents, other family members and the wider community, together with early childhood settings, hold the key to early language development. Building capacity in families enables them to have the confidence and competence to interact more intensively with children. But capacity and expertise in early childhood settings

must also be boosted. For many children, especially the most vulnerable, early childhood programs hold the key to strengthening language and in turn, pre-literacy skills.

Boosting reading readiness in early childhood settings

Early childhood education programs can play a vital role in boosting reading 'readiness.' Most preschool aged children participate in some form of early childhood program, but many miss out, many are under served and many attend programs of dubious quality.

The much welcomed proposals for universal preschool announced recently by the Federal education minister will help address the urgent need for the most disadvantaged children to have a preschool education, but will need careful planning and management if all children are to benefit.

Gearing up for universal preschool requires a target date and a massive investment in resources and early childhood teacher training, a process that will take some years. We need to build capacity in terms of facilities, resources, places and staffing. Ideally, children will have the option of attending preschool for 3-5 days per week, there will be a better integration of care and education, and a shift away from the artificial two-tiered 'care' – 'education' system so entrenched across much of the country.

Ideally, early childhood programs act to complement families' day to day language building activities, but often they need to supplement and enrich language to ensure that the social and language gap so often noted at school entry is narrowed. It is not sufficient to provide all children with the same activities. All children need a carefully planned and focused learning program. But some need much more intensive scaffolding

– language modelling, conversations, question exchanges, and story reading and telling than others.

The importance of competent, qualified staff to promote literacy

Evidence indicates that the quality of the early childhood setting impacts significantly on children's experiences. Better qualified staff, and especially early childhood degree credentialed staff, provide richer, more personalised and better targeted learning environments for children.

Unfortunately, the qualification levels of staff in child care centres do not inspire confidence in their ability to create rich learning environments, let alone strong literacy programs. While evidence on the importance of quality pedagogy and the strong associations between quality environments, pedagogy and child outcomes, and qualified staff are robust, there has been little commitment to ensuring qualified practitioners in our early childhood centres and little, if any, monitoring of VET training delivery in the many hundreds of small private providers that offer these courses. Complicating the picture is the lack of a national agreement on what credentials are appropriate for staff in early childhood centres and what mix of credentials are needed within an early childhood service.

There is a clear need to improve quality and effectiveness in early childhood care and education or we are in danger of further widening the learning gap at school entry. The evidence is clear about what works. There just needs to be greater will, commitment and action. ■

This is an edited version of a paper presented to the DEST Reading Aloud Conference in Melbourne in August.

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Australian Certificate of



Education: Exploring a way forward



Professor Geoff Masters

Geoff is ACER's CEO and the author of the ACE report

Geoff Masters explains why Australia needs greater national consistency in senior school certificates and how an Australian Certificate of Education would likely benefit all Australian students.

Q. Your Year 12 son tells you he received a final mark of 19 for English.

How should you respond?

A. It all depends on where you live.

In New South Wales, marks are reported out of 100, making 19 a very low score.

In Victoria, the maximum score is 50, making 19 a slightly better result.

But in South Australia, where marks are reported out of 20, a score of 19 is worth celebrating.

Most other states do not report marks at all, and use A to E grades or achievement levels such as 'sound' and 'commendable'.

Confused? Many employers say they are. It's like changing currency every time you cross a border. Except it's worse: it's easy to convert Euros to Pounds or Dollars to Yen, but there is no obvious way of comparing Year 12 results across state boundaries. It is not clear whether a score of 80/100 in Accounting in NSW represents a higher or lower level of accounting knowledge and skill than a score of 40/50 in Victoria or how either of these compares to an 'exceptional' result in Tasmania or 'very high' achievement in Queensland.

With a population less than some American states, Australia now has ten different senior secondary certificates. Each of the six states and two territories provides a senior secondary qualification and the Victorian Certificate of Applied Learning is available

Current Australian senior school certificates:

ACT	ACT Year 12 Certificate
NSW	Higher School Certificate
NT	Northern Territory Certificate of Education ¹
QLD	Senior Certificate ²
SA	The South Australian Certificate of Education
TAS	Tasmanian Certificate of Education
VIC	Victorian Certificate of Education Victorian Certificate of Applied Learning
WA	Western Australian Certificate of Education



¹ based on procedures of the Senior Secondary Assessment Board of South Australia

² to be replaced by the Queensland Certificate of Education in 2008

for students planning to undertake apprenticeships, study at TAFE or enter employment directly from school. A tenth certificate, the International Baccalaureate Diploma, is offered in a number of schools. (See table above.)

Most state/territory certificates have evolved over many years, usually from a set of final-year subject examinations conducted for university entrance. Current arrangements are the result of locally negotiated 'settlements' and reflect different state/territory histories, educational philosophies, local schools of thought, and the influence of particular individuals and committees in each jurisdiction.

In all this variety, the states and territories are staunch defenders of their own systems. Some appear to consider their Year 12 arrangements superior to those of the rest of the country, which are variously described as lacking in academic rigour, unresponsive to local and student needs, too rigid and bureaucratic, based on narrow and limited forms of assessment, and captured by educational fads. It seems that a number of states would support a national approach if it meant others adopting their arrangements. In reality, there is a very limited basis for accepting any claim to superiority.

Contrast this with what is happening in Europe where the states of the European Union are collaborating to enhance the consistency and comparability of their educational qualifications. The aim is to increase the international competitiveness of European education, to promote mutual recognition of qualifications across nation

states and to facilitate student mobility. Under the so-called Bologna Process, considerable progress has been made towards the development of more consistent higher education arrangements and qualifications.

In 2005 the Department of Education, Science and Training (DEST) commissioned ACER to investigate and report on models and implementation arrangements for an Australian Certificate of Education. The report was released in May 2006.

The report, *Australian Certificate of Education: Exploring a Way Forward*, proposes the introduction of an ACE based on national standards for what is taught in Years 11 and 12 and for how well students should be expected to learn what is taught. These standards are captured in three key recommendations:

- The first recommendation calls for national agreement on what should be taught. Regardless of where they live in Australia, students should be able to engage with school subjects in similar depth and with similar academic rigour. In individual subjects (such as Economics, Biology and Advanced Mathematics) the identification of a core of essential knowledge, skills, ideas and principles was recommended.

The proposal is not that the entire curriculum for a subject should be the same across the country. Schools must be able to respond to local needs and circumstances and there is value in a degree of diversity in what and how students are taught and in opportunities for experimentation and innovation.

But in most senior school subjects, students should have guaranteed access to an agreed core of essential content.

- The second recommendation calls for students throughout Australia to be assessed against the same standards. Currently it is not possible to compare achievements in a subject such as Accounting from one jurisdiction to another. There is no way of knowing whether a 'Band 6' performance in NSW represents a lower or higher level of achievement than a 'Very High Achievement' in Queensland, or a study score of 40/50 in Victoria. The report stopped short of recommending the introduction of national Year 12 examinations. If results in a subject are reported in terms of the same set of achievement standards, then a level of comparability across jurisdictions will follow. Of course, to the extent that states and territories share examination and other assessment materials in a subject, this level of comparability will be improved.
- The third recommendation is that, to be awarded the ACE, students should be required to demonstrate acceptable levels of a few key capabilities: the ability to write in English; to read with understanding; to apply mathematical concepts to everyday problems; and to use computer technology. This recommendation was made because of claims that some students being awarded senior certificates have only limited mastery of these skills and because of research evidence that failure to master

How Year 12 subject results are reported:

ACT	a grade	(E, D, C, B, A); school assigned marks (mean 70; S.D. 12) not reported on certificate
NSW	a mark out of 100, placing the student's result in one of six 'bands'	(Band 1, Band 2, Band 3, Band 4, Band 5, Band 6)
QLD	an 'achievement level'	(Very Limited, Limited, Sound, High, Very High Achievement)
SA/NT	a score out of 20, placing the student's result in one of five grades	(E, D, C, B, A)
TAS	an 'achievement level'	(Preliminary, Satisfactory, Commendable, High, Exceptional Achievement)
VIC	a score out of 50	
WA	currently: a grade (E, D, C, B, A)	proposed: a 'level' (3, 4, 5, 6, 7, 8) and a 'band' (first/medium/high) within that level

Source: ACER (*An Australian Certificate of Education: Exploring A Way Forward*)

these basics (especially reading and writing) is correlated with poorer employment, health and social outcomes.

Commonwealth, State and Territory ministers of education recently decided to establish a working party to examine the feasibility of developing a common scale for reporting all senior secondary subject results. This proposal, led by Victoria, is a welcome development if it leads to a common language for reporting Year 12 results.

But a common language (such as A to E grades) is only a first step. The bigger challenge – and one that the ministers appear to have taken up – is to ensure that it is just as difficult to achieve an 'A' in, say, advanced mathematics in NSW as it is to achieve an 'A' in WA. This level of consistency requires agreement on how much knowledge, understanding and skill students need to have, and the quality or depth of understanding they need to demonstrate, to receive an 'A' in each state and territory.

And this highlights the next difficulty. Money is money, whether measured in Dollars, Euros or Yen. But can Chemistry results be compared meaningfully from one state to another? The answer to this question depends on how similar Chemistry curricula are across Australia. To the extent that Year 12 curricula vary from one state to another, any attempt to introduce a common reporting language and to compare grades or marks across the country is likely to be of limited value.

For students wishing to enter university, an attempt is made to provide nationally

comparable tertiary entrance ranks (ENTER scores). But the process used to do this makes the assumption that students in each state/territory have the same overall distribution of achievement: a necessary but dubious assumption in the light of other evidence about interstate differences. Some university selection officers now believe that students from some states are less well prepared than their ENTER scores suggest.

Surprisingly, very few attempts have been made to investigate what students are taught in the final years of school in Australia. Some authorities are able to develop and maintain detailed syllabuses and annual examinations in dozens of subjects; others have no option but to leave curriculum development and student assessment in the hands of schools.

At present, there is considerable duplication of effort across Australia. For a subject such as Physics, seven authorities develop seven different syllabuses/curriculum frameworks and their associated examinations/assessment procedures for essentially the same group of (tertiary bound) students. In community language subjects with small candidatures, jurisdictions already collaborate to make more efficient use of scarce resources, raising the question of whether a similar sharing of effort and materials might be possible in a subject such as Physics.

Earlier this year, the Australian Government initiated an ACER investigation into what is being taught in senior school English, Mathematics, Physics, Chemistry and Australian History courses. This investigation will tell us whether curricula in these subjects are sufficiently similar to permit the kind of consistency in reporting that the

ministers are seeking. It also will provide a basis for thinking about what should be taught, and especially what core content all students taking a subject should have an opportunity to learn. On this question there's bound to be vigorous debate, as there should be in relation to curriculum matters.

Throughout Australia, common challenges are being addressed in the senior secondary school. These include meeting the needs of the more diverse group of students now participating in this phase of schooling; providing a broader range of curriculum offerings; facilitating pathways between school, training, higher education and work; and ensuring that all young people have the skills required for life and work beyond school. Some of these challenges may benefit from increased national collaboration.

Is there a case for an ACE? The recent investigation highlighted the extent of interstate differences, inconsistencies and duplication in senior secondary arrangements. These differences do not reflect differences in student needs. Although any move towards an Australian Certificate of Education must recognise and build on to the strengths of existing state/territory arrangements and must enable experimentation and innovation to meet local needs, greater national consistency in expectations and standards, improved comparability, and reduced duplication are likely to benefit all Australian students. ■

The report is available at www.dest.gov.au/ace.

Improving

science learning



By Dr John Ainley

John is Deputy CEO (Research) and Research Director of the National and International Surveys research program.

*Science education experts have called for an urgent re-thinking of the way science is taught in Australia arguing that a greater focus on enquiry and reasoning is needed to boost students' waning interest in science as **John Ainley** explains.*

The recent ACER conference *Boosting science learning: what will it take?* concluded with a session led by a panel of experts developing a three-point proposal for science education. Those attending the conference endorsed the proposal that:

- We need to re-imagine science education, accepting a shift that is occurring, and must occur, in the way we think of its nature and purposes.
- To achieve this re-imagined science education we need to develop:
 - a new metaphor for science education that will capture its nature; and
 - rigorous assessment processes appropriate to this re-imagined science education.
- There needs to be a national teacher education agenda focusing on re-imagining the role of the science teacher and developing teachers' capabilities (knowledge, pedagogy, and disposition)

that enable the support of the new directions.

A desire to have a focus on science enquiry and reasoning in science education came through in many of the papers delivered at the conference. Speakers and delegates agreed that science education must be connected to students' interests and priorities with a greater focus on ideas, evidence and argument.

Any moves towards a national agenda for science curriculum and assessment need to take this re-imagined way of teaching science into account. Changes might include making learning more relevant to real life issues, more debate and research in the classroom, and more student choice about topics studied.

Science teachers would require new pedagogies, knowledge and commitments in order to undertake some of the innovative projects and directions described at the conference. Teacher training would be vital in creating engaging and dynamic teachers. They would need to be supported to take risks in a new kind of science education.

ACER chief executive officer, Professor Geoff Masters concluded the conference by calling on the federal, state and territory governments to make a national response to address students' declining interest in science.

Earlier presentations at the conference leading to these proposals included:

Crisis of interest in science needs humanistic approach

A humanistic approach to curriculum is urgently required in order to address the current crisis of interest in science. Despite an apparently rich set of positive options for increasing student interest in science a number of constraints imposed by science teachers, academic science and competing systemic demands stand in the way of implementing them.

Professor Peter Fensham of Queensland University of Technology said students are not enjoying studying science. Most have concluded that post-compulsory science studies should be avoided unless needed for some career purpose.

International research suggests that students' interest in science could be heightened if curricula and assessment requirements made it possible for students to learn science as a story involving people, situations and actions, real world situations that students can engage with, Professor Fensham says.

Peter Fensham is Emeritus Professor of Science Education at Monash University and is an adjunct professor at Queensland University of Technology.

Science curriculum must focus on ideas, evidence and argument

Current practices in science education may be leaving many students poorly educated about science and with an ambivalent or negative attitude towards science according

to Professor Jonathan Osborne of King's College London. He argues that science education requires a shift in focus towards ideas, evidence and argument that is more appropriate to the needs of the future citizen and the values of contemporary youth.

Professor Osborne argues by presenting science to young students as a body of knowledge that is unequivocal, uncontested and unquestioned, educators may be putting young students off studying science beyond the compulsory years.

"There is a growing recognition that we need to educate our students and citizens about how we know, and why we believe in the scientific world view," Professor Osborne says. "Teaching science needs to accomplish much more than simply detailing what we know."

Jonathan Osborne holds the Chair of Science Education at the Department for Educational and Professional Studies, King's College London. He is also currently head of department and President of the US National Association for Research in Science Teaching (NARST).

Science curriculum requires greater focus on community

If science education is to remain useful to students outside of school the curriculum must move beyond the textbook, using community resources to explore science-related community issues according to Professor Léonie Rennie of Curtin University of Technology.

Research studies have shown consistently that the majority of our high school students find school science to be unimportant, unengaging and irrelevant to their life interests and priorities. For them science has little personal or cultural value.

"Our challenge is to turn around this disinterested majority by making it worth students' while to learn science in a meaningful way," Professor Rennie says.

This requires changing the curriculum so that it has demonstrable relevance and value

to these students. A powerful avenue to achieve this involves bringing science at school and science in the community much closer together. Using community resources to complement those in school increases the variety of stimuli and sources of information available to students and promotes learning that is self motivated, voluntary and guided by learners' needs and interests.

Léonie Rennie is Professor of Science and Technology Education at the Science and Mathematics Education Centre and Dean, Graduate Studies at Curtin University in Western Australia.

Boosting science learning through curriculum materials

Effective curriculum materials are central to enhancing science teaching and learning, according to visiting expert Dr Rodger Bybee of the US Biological Sciences Curriculum Study.

In his keynote address Dr Bybee argued that curriculum developers must:

- pay close attention to the criteria for student learning and the appropriate translation of those requirements to curriculum materials;
- use an instructional model that provides opportunities and time for conceptual change and development of cognitive abilities;
- use 'backward design' for the process of designing and developing the scope and sequence of the curriculum; and
- incorporate a means to enhance teachers' knowledge base, including subject matter, pedagogical content knowledge, and teaching strategies.

"In the end, we want to provide curriculum materials that enhance science teaching and student learning," Dr Bybee says. "Science curriculum and instruction should facilitate conceptual change and instruction should be based on fundamental concepts and complementary facts and provide opportunities for students to learn and develop metacognitive strategies."

Dr Rodger W. Bybee is executive director of the Biological Sciences Curriculum Study (BSCS), a non-profit organisation in the United States.

Highly accomplished science teachers deserve higher pay

The quality of science teaching and learning in our schools would be improved if science teachers were assessed and highly accomplished teachers rewarded with a higher salary, according to a paper by Dr Lawrence Ingvarson and Ms Anne Semple.

ACER, in conjunction with the Australian Science Teachers' Association, conducted preliminary research to develop new methods for gathering evidence about teaching performance that might be used in a system for providing recognition to highly accomplished science teachers. This involves collecting a professional portfolio of items to provide evidence of capability in relation to professional standards.

Dr Ingvarson said improving the quality of science learning in our schools will require more effective policies and career pathways for attracting, developing and retaining effective science teachers.

"We need credible methods for defining what we think good science teachers should know and be able to do, for gathering evidence about performance and assessing whether that evidence indicates that the standards have been met," Dr Ingvarson said. "Our research shows that we can define good science teaching, we can gather valid evidence of good teaching, and we can assess that evidence reliably."

Dr Lawrence Ingvarson is a Principal Research Fellow at ACER. Co-author Ms Anne Semple is a past president of the Australian Science Teachers' Association and an independent education consultant. ■

The full conference proceedings are available in the Professional Learning section of the ACER web site www.acer.edu.au

ACER conducts Principal for a Day program



The Principal for Day program has found a new home with ACER.

The program assists in building relationships between government schools and leadership in other parts of the community, including the corporate world, by placing business and community leaders in schools where they become Principal for a Day. The program is funded in Victoria by the Victorian Department of Education and Training and supported by education credit union **mecu** Limited.

ACER took on the running of Principal for a Day in 2006. ACER's chief executive Professor Geoff Masters explained that the Principal for a Day program provided an ideal fit with ACER's goal to expand on the work it does in support of school leadership.

"Research points to the importance of strong leadership in schools, especially in disadvantaged schools, and the Principal for a Day program tackles this issue head on," Professor Masters said.

The program was started by the Victorian Government in 2001 and has since involved almost 800 Australian leaders from all walks of life. Now in its sixth year, the program has expanded to NSW, Queensland and the ACT.

The 2006 event took place in Victoria on 17 August involving 85 'Principals for a Day', including Professor Masters who was the Principal for a Day at Broadmeadows SC with principal Greg Williams.

Professor Masters was joined by 'repeat' participants such as the Victorian Treasurer John Brumby, VicHealth's Rob Moodie and Telstra's Andrea Grant together with first-timers Victorian Education Minister Lynne Kosky, Albert Goller, Managing Director of Siemens Australia, Sandie de Wolf, CEO of Berry Street Victoria and Emergency Services Commissioner, Bruce Esplin.

Independent research, funded by **mecu** Limited, has confirmed Principal for a Day's efficacy in building lasting relationships between government schools and leaders from the corporate world and the broader community.

Dr Geoff Beeson, on behalf of Deakin University, is evaluating Principal for a Day in all states over the 2004-2006 period. According to Dr Beeson's Interim Report, "At this stage the most striking feature of the evaluation is the very positive endorsement of the Principal for a Day program by both principals and the business and community leaders involved." ■

Further information on Principal for a Day is available on the website at www.acer.edu.au/pfad/



Top: Victorian Education Minister Lynne Kosky was Principal for a Day at Altona Green Primary School

Above: ACER chief executive Geoff Masters with students at Broadmeadows Secondary College

Survey to provide snapshot of Australian teaching workforce



Information gathered from a new survey of staff in Australian schools will provide a much-needed demographic picture of the Australian teaching workforce and highlight specific workforce issues. The Staff in Australia's Schools Survey is being conducted by ACER until December this year with the assistance of the Australian College of Educators (ACE).

Over 20 000 teachers and school leaders from more than 2000 government, Catholic and independent schools across Australia have been randomly selected and invited to take part. The survey aims to describe more fully the teacher workforce by gathering information such as gender, age, school sector and level, qualifications and work roles. Attitudinal information regarding career plans, working conditions and attraction to leadership roles will also be collected to support future workforce planning. More information is available from <http://sias.acer.edu.au/>

Perceptions of the International Baccalaureate Program

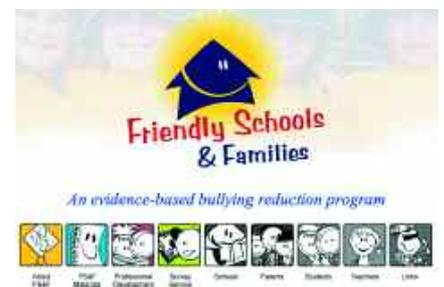
The number of secondary students completing an International Baccalaureate (IB) Diploma has risen rapidly in recent years, and the IB is playing an increasing role in preparing people for university study. The International Baccalaureate Organisation (IBO) is interested in universities' perceptions of the IB as a preparation for undergraduate study, and has engaged ACER to research this area of higher education. A survey is being conducted of senior university staff at all Australasian universities, which will be followed by a series of interviews. The study commenced in September and will run until early 2007.

ACER and CERT sign memorandum of understanding

ACER has signed a memorandum of understanding with the Centre of Excellence for Applied Research and Training (CERT) to collaborate on the design and delivery of professional development programs and teacher training in the United Arab Emirates.

CERT is the commercial arm of the Higher Colleges of Technology in the UAE and is in the business of developing and providing education, training and applied technology for public and private sector clients. It is also involved in strategic alliances with a number of large multinational organisations in developing a diverse range of business and technology solutions. For more information on CERT visit www.certonline.com

Friendly Schools and Families Bullying Prevention Program



ACER Press has successfully tendered for the commercialisation rights to the *Friendly Schools and Families Bullying Prevention Program* developed by Dr Donna Cross and Dr Erin Erceg of Edith Cowan University. *Friendly Schools and Families* is an evidence-based, whole-school bullying reduction program that is used extensively in schools in WA and increasingly across Australia. Barbara Smith will take the role of Project Director, co-ordinating the national roll-out of the program including sales, professional learning, consulting and survey services. More information about the program can be found on the website:

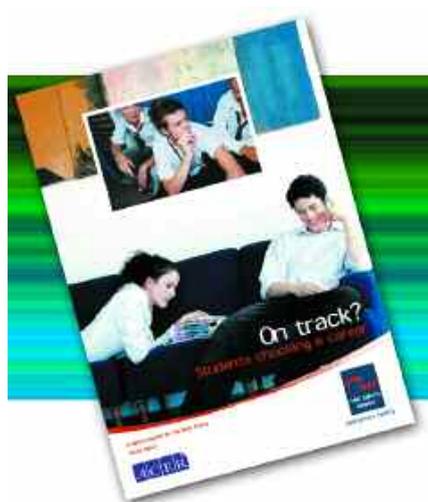
<http://www.friendlyschools.com.au/>

PISA 2006 testing

ACER is conducting the Australian national component of the OECD Programme for International Student Assessment (PISA) for 2006. The PISA 2006 assessment was undertaken in Australia between July and September. PISA assesses 15-year-old students in almost 60 countries in reading, mathematical and scientific literacy. The main focus of the assessment in 2006 is on scientific literacy. The current cycle of testing

in Australia involved approximately 14 000 students from 358 schools across the country. Participating students completed an assessment booklet which contained questions from the major domain (scientific literacy) and one or more of the minor domains of mathematical and reading literacy. A national report is planned for release in 2007. ACER also leads an international consortium that conducts PISA internationally for the OECD.

Generation Y students choose careers on interests



A major national study conducted by ACER for The Smith Family has revealed that many 'Generation Y' Australian students are choosing careers based on their interests, not money.

The study of more than 1300 disadvantaged Year 11 and 12 students who are receiving support from The Smith Family's *Learning for Life* program found that anticipated income does not factor in their plans to attend university. The type of role and how

closely it aligns with their interests and abilities has emerged as the deciding factor for these teens rather than the potential size of their pay packet.

On track? Students choosing a career was released in May 2006 and is available from www.smithfamily.com.au.

Professional development in Pakistan

The ACER International Institute has been contracted by the British Council in Pakistan to provide a range of training programs to staff of the Institute of Educational Research at the University of the Punjab in Lahore, the Federal College of Education in Islamabad, the National Education Assessment System (NEAS) in Islamabad and the Provincial Education Assessment Centres (PEACE). The project involves ACER staff providing 10 weeks of training in Pakistan and 10 weeks of training in Australia between June 2006 and Nov 2007. The provision of the training began in Lahore in June with ACER Research Fellow, Hamish Coates, providing a two week course on Research Methods. This was followed by a two week program on Test Construction delivered by Senior Research Fellow, Assessment and Reporting, Margaret Wu in Lahore in July.

The training program is designed to build the capacity of those involved in the national assessment of students in four content areas (social studies, urdu, maths and science) and across three year levels (years 3, 5 and 7) which was introduced in 2005.

ACER researcher takes out AUQF Best Paper prize



Hamish Coates

ACER Research Fellow, Dr Hamish Coates, was awarded the Best Paper prize at the Australian Universities Quality Forum held in Perth in July. Dr Coates's paper was entitled *Excellent Measures Precede Measures of Excellence*. The paper identified quantifiable indicators that might enhance the national evaluation of learning and teaching in Australian higher education including the possible development of new indicators. Dr Coates also took out the prize for best workshop at the forum in conjunction with Cindy Tilbrook, Executive Director of Graduate Careers Australia.

Newly registered teachers in Victoria

The Victorian Institute of Teaching (VIT) has commissioned ACER to assist in the development of on-line questionnaires for the 2005 cohort of provisionally registered teachers, their mentors and their principals. The surveys will examine the processes applying to provisionally registered teachers being considered for full registration, including the nature and extent of the professional learning and collaboration that occurred as a result. ACER will also analyse the responses and prepare a report.

Conference opens to beat of African buckets



Delegates to ACER's Research Conference 2006, *Improving Science Learning*, in August were welcomed to Canberra's Hyatt Hotel by grade five students from Forrest School's Bucket Band with their unique version of African percussion.

The Forrest School Bucket Band was founded in 2005 by teacher Michael Rosenberg as an alternative activity for students who had not been selected for the school band program. The children make their instruments from recycled 25 litre plaster, chlorine and nappy buckets, which have been picked up on the side of the road or donated, and sticks made from lengths of dowel with the ends rounded. Fry pans, plastic bottles and lids are also used.

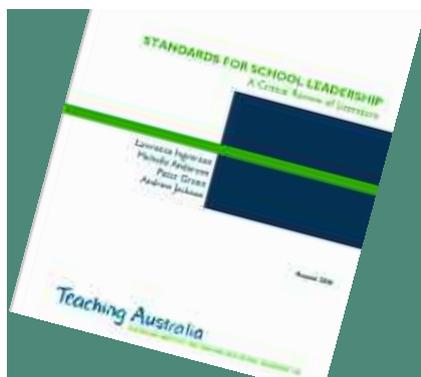
Proceedings from Research Conference 2006 are available for download from the Professional Learning section of the ACER website at www.acer.edu.au

CEET Conference

The Monash University-ACER Centre for the Economics of Education and Training held its 10th Annual National Conference in Melbourne on 3 November. This year's theme was *Australian Education and Training: New Policies*. The conference considered

education and training policies in relation to changes in the Australian population, workforce and economy. The opening address was presented by Michael Keating AC on 'Training and employment participation'. Michael Keating is chair of the Independent Pricing and Regulatory Tribunal (IPART), which has just released *NSW and the Future Challenges for Vocational Education and Training*. Further information can be found on the CEET website at www.monash.edu.au/centres/ceet

Teaching Australia reports



Teaching Australia has released new reports on professional teaching standards together with a guide to each report. Two of the studies were completed by teams of researchers led by Dr Lawrence Ingvarson. *Standards for School Leadership: A Critical Review of the Literature* and *Standards for Advanced Teaching: A Review of National and International Developments* can be downloaded from the Teaching Australia website at www.teachingaustralia.edu.au

Growth in Literacy and Numeracy in the First Three Years of School



ACER has published its Research Monograph 61 entitled *Growth in Literacy and Numeracy in the First Three Years of School*, by Marion Meiers, Siek Toon Khoo, Ken Rowe, Andrew Stephanou, Prue Anderson and Kathy Nolan. The report describes the findings from the first three years of the ACER Longitudinal Literacy and Numeracy Study, spanning the period in which the students in the study entered school and continued into their second and third years of school. The report can be downloaded from www.acer.edu.au Print copies may be purchased from ACER Press for \$34.95. (Phone customer service on 03 9835 7447 or order online from www.acerpress.com.au).

Family Expectations and Post-School Plans

The Smith Family has commissioned ACER to conduct a study of Family Expectations and Post-School Plans. The project will combine a major literature review with around 10 case studies of young people and their families. The young people are from disadvantaged backgrounds and are participating in the Smith Family's *Learning for Life* program. The project began in August and will conclude in March 2007.

Research Conference 2007

ACER's Research Conference 2007 will take place in Melbourne from 12-14 August. The theme is *The Leadership Challenge - Improving learning in schools*. The conference will address key issues related to building leadership in schools that make a difference to student learning outcomes. Conference speakers will include Professor Philip Hallinger, Mahidol University, Bangkok; Dr Chris Sarra, Indigenous Education Leadership Institute, Queensland; Professor Viviane Robinson, University of Auckland; and Professor Sheryl Boris-Schacter, Lesley University, Massachusetts. Further information on Research Conference 2007 will be posted on the Professional Learning section of the ACER website at www.acer.edu.au as it becomes available.

Indigenous Language Programs

The Australian Government Department of Education, Science and Training (DEST) has commissioned ACER to conduct a comprehensive literature review and a mapping exercise to capture what is happening nationally with respect to Indigenous languages in schools. The project will include an analysis of existing models of teacher preparation and professional learning, case studies of good practice and an evaluation of the New South Wales Master-Apprentice model. The project commenced in July 2006 and will conclude in August 2007.

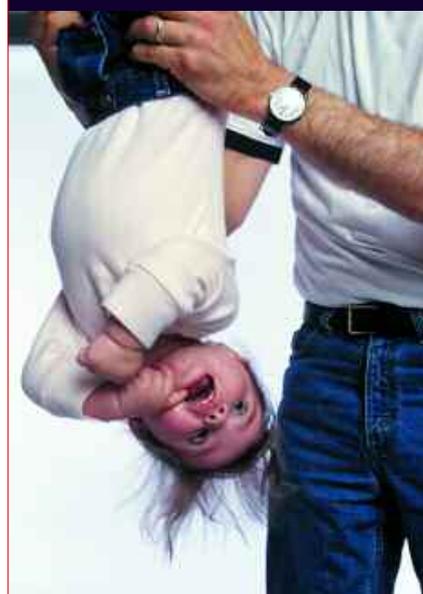
Australian Education Review 50



Australia is at a crossroads when it comes to early childhood care and education services according to *Early Childhood Education: Pathways to quality and equity for all children* by Dr Alison Elliott, published by ACER in November as Australian Education Review 50. The provision of early childhood care and education services in this country is described as insufficient, fragmented, under funded and inconsistent. The review calls for a coherent, long-term national action plan and timeline to develop and implement an integrated, well-funded, regulated and managed system of early childhood education and care with clear goals, priorities and outcomes.

Early Childhood Education: Pathways to quality and equity for all children, by Dr Alison Elliott with a foreword by Professor Alan Hayes, Director, Australian Institute of Family Studies, is available for download from the ACER website at www.acer.edu.au. Print copies can be purchased from ACER Press. Contact customer service on (03) 9835 7447 or buy online at www.acerpress.com.au

Hanging out for the next Research Developments?



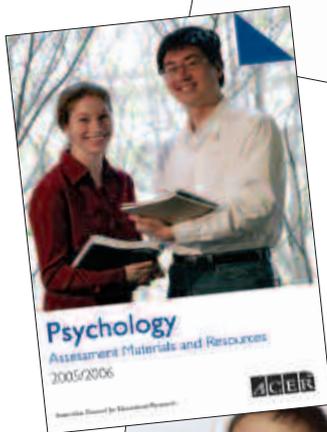
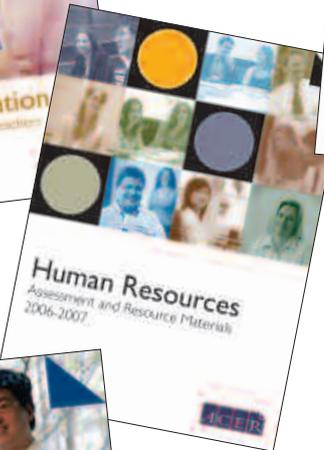
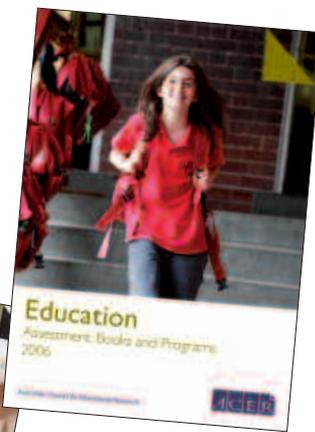
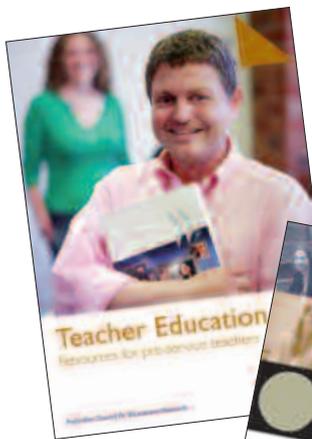
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