Schools First

New awards for school-community partnerships

Assessing and reporting employability skills of senior secondary students

Supporting improvement in literacy and numeracy skills

First national literacy and numeracy tests introduced

International mathematics and science study shows mixed results for Australia

School careers advice well received by students
Specifying and assessing skills for life

A fundamental purpose of schooling is to provide every student with knowledge and skills to equip them for life beyond school. Yet many students are able to complete 13 years of school and receive a senior school certificate without being required to demonstrate minimum standards in skills essential to successful functioning as an adult member of Australian society and the workforce.

Speaking at ACER's annual Research Conference in Brisbane in 2008, I argued that, in addition to developing basic skills of reading, writing and numeracy, every student completing 13 years of school should be expected to meet at least minimal standards of scientific literacy, ICT literacy, and civics and citizenship knowledge. Employer groups have called repeatedly for greater attention to the development of employability skills such as planning and organising, teamwork, initiative and enterprise, self-management and skills for learning.

The presentation prompted discussion about just what skills and understandings students should be expected to have before leaving school and how these might be identified and assessed.

The articles in this edition of Research Developments describe some of the work that ACER is doing in the area of assessing and reporting on skills for the future.

Gabrielle Matters outlines the main findings of research into the assessment and reporting of the employability skills of senior secondary students. Chris Freeman describes ACER’s contribution to the National Assessment Program – Literacy and Numeracy (NAPLAN). For the first time, all students in Australia in Years 3, 5, 7 and 9 have been assessed in literacy and numeracy using the same year level tests. In late 2008 the latest results from the Trends in International Mathematics and Science Study (TIMSS 2007) revealed that Australia is doing a good job at educating our students to an average standard and prompted the question ‘is average good enough?’

Kylie Hillman’s article reminds us of the importance of career guidance in helping students to make a smooth transition from schooling to the world of work or further education.

And research conducted by ACER shows how effective school-community partnerships can result in improved student outcomes including: greater student engagement, improved attendance and retention, better academic performance, increased skills and improved transitions into the workforce, further education or training. ACER is pleased to be a partner in the National Australia Bank’s Schools First initiative. Michele Lonsdale’s article outlines ACER’s role in assessing applications for awards. We look forward to working closely with our partners on this initiative over the next three years.

Professor Geoff Masters
Chief Executive Officer
CONTENTS

Research Developments No. 20 Summer 2008-2009

02 New awards for school-community partnerships
06 Assessing and reporting employability skills of senior secondary students
10 Supporting improvement in literacy and numeracy skills
12 First national literacy and numeracy tests introduced
16 International mathematics and science study shows mixed results for Australia
20 School careers advice well received by students
23 ACER Update
new awards for school-community partnerships

ACER is a partner in Schools First, a new initiative to help build school-community partnerships, as Michele Lonsdale explains.
Michele Lonsdale is a Principal Research Fellow in Policy Analysis and Program Evaluation.

Schools First is a national initiative that aims to build stronger partnerships between schools and their local communities. Schools First will provide regional, state and national awards to schools to the value of $15 million over the next three years.

The Schools First Awards have been developed by National Australia Bank and three not-for-profit organisations: ACER, Australia Cares, and the Foundation for Young Australians. National Australia Bank has committed to funding the awards and all operating costs for the program over the initial three years.

In recent years there has been a growing recognition that responsibility for the learning and development of young people needs to be shared across the community rather than vested solely in schools. ACER reviewed the research on school-community partnerships to identify the benefits such partnerships can bring to schools and the key characteristics of highly effective partnerships.

Strong school-community partnerships have been associated with greater student engagement, improved attendance and retention, and better academic performance. In particular, effective school-community partnerships give schools a much broader range of resources and support networks on which to draw.

The research highlighted the importance of partnerships which are genuinely co-operative and sustainable. Highly effective school-community partnerships have strong leaders; a shared vision that prioritises improved outcomes for students; regular processes for the joint monitoring of goals, activities and outcomes; and tangible results.

ACER’s research findings are consistent with current federal and state/territory approaches to social inclusion which see education as the key to overcoming disadvantage and opening up opportunities for young people to participate meaningfully in society. School-community partnerships provide collective strength and mutually beneficial outcomes for schools and the communities they serve.

This research has shown that strong partnerships between schools and their communities can have considerable benefits for students, and we have been keen to find ways to encourage effective partnerships.
Schools First will support and recognise highly successful school-community initiatives.

The primary objective of Schools First is to improve student outcomes – by recognising and strengthening the social networks that already exist between schools and their communities, and by encouraging new relationships and initiatives.

There are many ways in which community groups, parents and businesses might work with their local school to improve outcomes for young people. Schools First encourages local, tailor-made solutions to the challenges facing schools. Communities could provide support in the form of financial or human resources, time, infrastructure, skills, tools, talents and enthusiasm.

The awards program involves three stages: up to 60 regional awards, eight state/territory awards, and one national award. There will be two types of awards. Impact Awards will recognise effective school-community partnerships that can demonstrate successful outcomes. There will also be a smaller number of Seed Funding Awards that will recognise fledgling partnerships with great potential. In these cases the awards will provide initial funding to progress the collaboration.

Schools First is open to every primary and secondary school in Australia. Potential partners could include small or large businesses, health providers, libraries, parents, local government bodies, Chambers of Commerce, retirement villages, Rotary, Apex, Lions clubs, other schools, TAFEs, universities, kindergartens, and child care centres. A school might even partner remotely with a community group via technology.

**Awards criteria**

ACER developed the entry and judging criteria for the awards, will train the judges to ensure consistency in the assessment of schools’ applications, and will provide customised feedback to schools. Schools First is intended to recognise and celebrate excellence in school-community partnerships. Applications for the awards are assessed on a number of criteria. In particular, schools must show that their partnership:

- has been set up to address an identified need or opportunity
- is well-planned and genuinely collaborative
- has been managed and implemented effectively
- has led to improved outcomes for students; and
- can be sustained.

The award criteria are based on research findings and have been developed by ACER with input from Australia Cares and the Foundation for Young Australians. The criteria have been piloted with a small number of teachers and principals from a range of schools.

The judging will be undertaken by a group of experienced educators with a deep understanding of schools, the award criteria and the goals of the Schools First program. Site visits will be made to each of the state/territory award-winning schools, enabling the assessors to verify the information provided in the applications.

The awards program will be supported by a series of 80 regional workshops to assist schools in developing their applications. Workshop facilitators will provide toolkits for participants including templates for planning partnership projects and examples of successful school-community partnerships. Principals, teachers, students, parents, local government, health organisations, local businesses, community leaders and interested citizens will be able to attend the workshops.

Following the judging, schools will receive short customised reports about their applications, incorporating feedback from the assessors. These reports will help schools to identify what they are doing well and what they might do to further develop their community partnerships.

Another feature of this initiative will be the development of a ‘knowledge bank’ of information and advice on the Schools First website. All schools will have access to this knowledge bank and winning schools will contribute to this resource each year.

The impact of Schools First will be formally evaluated, making it one of only a handful of award programs globally to have its effectiveness measured. This monitoring will enable the program to be refined over time.

Launching Schools First in Melbourne in October 2008, Deputy Prime Minister Julia Gillard said, “Schools First shows real vision and real commitment, and I know it will make a real difference... The education of the next generation is not just a task for parents and teachers, but a task for all of us.”

The Deputy Prime Minister also noted that one of the ideas presented at the Australia 2020 Summit earlier in the year had been to create a coordinated partnership between Australia’s top businesses and Australian schools, and that the Schools First initiative was exactly the kind of national collaboration that would help that to happen.

Visit the Schools First website [www.schoolsfirst.edu.au](http://www.schoolsfirst.edu.au) for more information and to register your interest in the awards program.
Beyond the Classroom, launched by ACER Press in November, discusses networks involving the school, parents, community and businesses. Author Rosalyn Black, from the Foundation for Young Australians, calls for new models of schooling that recognise that the future of young people is the responsibility of the whole community. These models should form the basis of a new social alliance across school systems enabling all young people to take an active – if not leading – role in that community, beyond the school gates.

The book argues for collaborative networks that can address the deep systemic barriers that are preventing educational success for too many young Australians. It argues for new ties among schools and school systems and between schools, their local communities and the business, philanthropic and community sectors that go beyond the classroom to create greater opportunities for children and young people.

The book will be of interest to schools considering becoming involved in Schools First, education policy makers, school system administrators and managers, state and federal politicians, education researchers and academics, school principals, senior primary and secondary school teachers.

Beyond the Classroom is published by ACER Press and is available from ACER Customer Service for $34.95.

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Assessing and reporting employability skills of senior secondary students
Gabrielle Matters describes a study, undertaken with David Curtis, that has developed a new picture of how senior secondary students’ achievement of employability skills across Australia might be assessed and reported.

It is now widely recognised that the skills and knowledge that students need for life and work beyond school are much more than proficiency in the traditional ‘3Rs.’ As Australia’s economy continues to evolve in response to technological developments and the need to compete in a global market, the nation needs a highly skilled and flexible workforce. Apart from the basic skills of reading, writing and numeracy; a broader range of skills and knowledge is now essential for students to make an effective transition from school to work. This includes knowledge in scientific literacy, ICT literacy, civics and citizenship and employability skills (including planning and organising; teamwork; initiative and enterprise; self-management; and learning).

But while employers and educators alike acknowledge the importance of employability skills, their formal recognition has been hindered to date by the lack of appropriate methods for assessing and reporting on skills of this kind.

Six years ago, the Australian Chamber of Commerce and Industry (ACCI) and the Business Council of Australia (BCA) report, Employability Skills for the Future drew attention to the need for young people to develop a range of general skills that are important in the workplace. That 2002 report identified an Employability Skills Framework consisting of eight key skills:

- communication that contributes to productive and harmonious relations between employees and customers
- teamwork that contributes to productive working relationships and outcomes
- problem solving that contributes to productive outcomes
- initiative and enterprise that contribute to innovative outcomes
- planning and organising that contribute to long-term and short-term strategic planning
- self-management that contributes to employee satisfaction and growth
- learning that contributes to ongoing improvement and expansion in employee and company operations and outcomes; and
- technology that contributes to effective execution of tasks.

Each of the key skills was further defined by a number of facets which illustrate specific applications of each skill. Facets are elements of each
skill that employers have identified as important, with the specific mix and priority of facets being job-dependent. One of the facets of communication, for example, is ‘reading independently’.

ACER chief executive Geoff Masters took the discussion further in his 2006 report Australian Certificate of Education: Exploring a way forward. He recommended that priority be given to developing and recognising the eight employability skills identified by ACCI and BCA. He also called for further investigation into ways of assessing employability skills in the final years of school.

Those recommendations prompted the former Commonwealth Department of Education, Science and Training (DEST) to commission ACER to investigate the most effective ways of assessing and reporting on the employability skills of senior secondary students.

Objectives and activities

Our study was undertaken between July 2007 and January 2008. During that time there was a change of government and the new Department of Education, Employment and Workplace Relations (DEEWR) became responsible for the initiative. The current Minister for Education, Julia Gillard, released A Study into the Assessment and Reporting of Employability Skills of Senior Secondary Students, in mid-October 2008.

The study’s objectives were:

• to identify and consider appropriate methods for the assessment and reporting, on a nationally comparable basis, of Year 12 students’ achievements in relation to eight specified employability skills;
• to ensure that the proposed methods for assessment and reporting were valid, reliable, objective, feasible, usable and nationally comparable; and
• to ensure that the proposed methods of assessment and reporting recognise employability skills already embedded in curriculum and pedagogy.

Our main task in this project was to evaluate options for assessing and reporting each of the eight employability skills against five criteria, and to recommend a preferred approach.

As an adjunct to this project, the University of Western Sydney conducted a survey of employer satisfaction with the eight skills and how employers currently assess them.

The study was overseen by an advisory group, comprising employers and representatives of parent organisations, school systems including teachers and leaders, and Australia’s three peak business organisations, ACCI, BCA, and the Australian Industry Group.

Identifying and evaluating possible approaches

The study began with an analysis of existing assessment models in secondary schools, vocational education and training, and higher education institutions in Australia and overseas and identified seven approaches for more detailed evaluation:

• common assessment tasks;
• embedded development and assessment;
• portfolio construction;
• self-assessment;
• standardised assessment/testing;
• teacher-generated task (including performance assessment); and
• teacher-group assessment (judgments by groups of teachers from different subjects).

Other approaches were canvassed but were not taken further because they were considered unfeasible in a school context.

Each of these seven approaches was then evaluated in terms of its validity, reliability, objectivity, feasibility, and usability. The various approaches had particular strengths and weaknesses. None of the methods satisfied all the criteria, pointing to a need for compromise with a combination of approaches.

Three assessment methods – standardised testing, common assessment tasks and teacher-group judgment – rated well on at least several of the evaluative criteria and appear to provide a basis for valid, reliable and fair reporting of achievement. As such they were selected for more detailed examination.

A further criterion of ‘backwash effect’ was also considered in reviewing the possibilities. This is the influence, positive or negative, of the chosen assessment method on curriculum and teaching/learning. Of the three suggested approaches, one – common assessment tasks – emerged as the preferred approach. This method meets the criteria at least as well as any other while at the same time being the most likely to have positive ‘backwash effects’ on teaching and learning because it is capable of providing immediate feedback and therefore is most likely to lead to gains in students’ understanding and application of employability skills. Because of the need to maintain test security, standardised tests provide fewer opportunities for feedback. And there would be limited opportunity for feedback to students in the case of teacher-group judgment, which occurs after a sustained period of observation.

Our study proposed three described levels of performance – Advanced, Creditable and Basic – for reporting each employability skill, with the possibility of an ‘ungraded’ result where evidence is lacking. We also proposed two ways of reporting: a simple listing of results and a visual display that would highlight skills.

Conclusions

This study showed that assessing and reporting on employability skills in a way that conforms to the hallmarks of
educational measurement, such as validity and reliability, is a complex task that would place a high—perhaps unrealistic—demand on schools. Nevertheless, the development of employability skills is too important in assisting students to make the transition from compulsory schooling to the workforce for an effort not to be made. Our findings suggest that compromise may be required. No single approach will provide an adequate assessment of all eight employability skills. Indeed, different facets of each employability skill may require different approaches.

Further information

Literacy and numeracy resources developed by ACER for the Commonwealth Government will provide extra support to underperforming students, says Jocelyn Cook.

Literacy and numeracy are foundation skills for a successful education and a productive life. Improved literacy and numeracy outcomes encourage higher school retention rates, lead to improved employment opportunities, enhance engagement in society and support future economic prosperity.

ACER’s work to develop materials for An Even Start – National Tuition Program, a Commonwealth government initiative, aims to address the learning needs of students who require additional assistance to acquire satisfactory literacy or numeracy skills.

The Even Start program funds tuition for students who have not met the national benchmarks in reading, writing or numeracy in Years 3, 5 and 7.

To ensure these students receive the best tuition possible for their individual needs, ACER has developed a kit of resources to support the program. The kit includes software for the pre- and post-tuition assessment tools, and supporting resources to help schools and tutors administer the assessments, identify individual student’s needs, and plan an appropriate tuition program for each student. This kit is available to every Australian school.

The pre-assessment diagnoses each student’s needs in reading, writing or numeracy so that schools, parents and tutors can plan tuition for each child and access appropriate supporting resources and teaching strategies relevant to the particular identified points of need or weaknesses.

Because the assessment instruments were developed to gauge the reading, writing and numeracy needs of students whose performance was reported as below the national
benchmark, these instruments were designed to have much greater precision in the measurement of weaker students.

The post-assessment measures student achievement and progress at the end of a period of tuition. The post-assessments mirror the skills assessed in the pre-assessments, although the post-assessments are a little harder overall so that progress can be measured.

In addition to individual results, the assessment tools also provide quantitative national data, which will form part of the overall program evaluation strategy, providing baseline data for an independent evaluation of the program.

The resource kit also contains the Components of Reading Investigation and the Investigation into the Components of Writing.

The Components of Reading Investigation is a series of small tests to be conducted one-on-one with students whose levels of achievement fall below the Year 3 reading benchmark. This tool aims to provide specific insight into the areas of difficulty experienced by those students who are not independent readers. It allows the teacher to focus on the student’s phonemic awareness, understanding of phonics, vocabulary and fluency.

The Investigation into the Components of Writing tool is specifically designed to give teachers more insight into the specific areas of difficulty for students struggling to develop writing skills.

All the Even Start resources developed by ACER are designed for use in an information and communication technology environment.

Assessments are also marked on-screen. Once student scores have been entered into the software, a detailed diagnostic report on the student’s performance is generated. These reports show which questions the student answered right or wrong and for which misconceptions may exist. Tutor resources linked to each question or group of questions are provided as website links in the software.

The aim of the Even Start program is a measurable improvement in the literacy or numeracy levels of eligible students.

Schools can download all of these resources by registering on the Even Start website at www.anevenstart.deewr.gov.au
First national literacy & numeracy tests introduced
More than one million students in years 3, 5, 7 and 9 participated in the National Assessment Program – Literacy and Numeracy (NAPLAN) in May 2008. Chris Freeman describes ACER’s contribution to NAPLAN through test development, data analysis and marking.

NAPLAN 2008 measured students’ performances in literacy, including reading, writing, spelling, grammar and punctuation, and numeracy, including mathematical concepts such as algebra, functions, patterns, space, measurement, chance and data.

This inaugural sitting of NAPLAN, conducted by the Ministerial Council for Education, Employment, Training and Youth Affairs (MCEETYA), was the first time all students in Australia in Years 3, 5, 7 and 9 have been assessed in literacy and numeracy using the same year level tests.

The national tests, which replaced a raft of tests administered by Australian states and territories, have reduced the level of duplication and improved the comparability of students’ results across states and territories. In the future, NAPLAN results may be useful in evaluating the effectiveness of educational policies and programs; in identifying the need for targeted interventions for individual students and groups of students; and in developing improved measures of school performance and greater transparency in national reporting.

Benefits for schools and students from NAPLAN depend on literacy and numeracy tests that are thorough, accurate and objective. In 2008 and 2009, NAPLAN test development, administration and marking are being conducted for MCEETYA by a range of educational organisations coordinated by Curriculum Corporation.

ACER is contributing to test development, data analysis and the marking of NAPLAN tests in some jurisdictions.

Test development

NAPLAN test development is a collaborative process involving literacy, numeracy and assessment experts from state and territory education departments and the Catholic and independent school sectors. It relies on the goodwill and support of schools and teachers around the country to assist in the test development process.

The development of NAPLAN tests involves a specific set of steps designed to ensure that they are of the highest standard. The tests are constructed to assess knowledge, skills and understandings appropriate to each year level; to be interesting and engaging to students throughout Australia; and to challenge students at all levels of ability.
The questions for the tests – the test items – are created through a process that draws on the creativity, experience and expertise of teachers. Teams of literacy and numeracy test developers – themselves teachers – conduct this specialised work which is underpinned by a NAPLAN assessment framework and by the national Statements of Learning which describe the key literacy and numeracy skills that all students in Australia should have.

Test items are reviewed at several stages in their development, first by other test developers and then by curriculum and measurement specialists from the Commonwealth, state and territory departments and Catholic and independent school sectors. Reviewers ask questions of the following kind:

- Do the items adequately address the literacy or numeracy domain that is the focus of the test?
- Is the item format – multiple choice, short answer, or extended response (in the case of writing) – the best format for assessing the particular knowledge, skills or understandings being tested?
- Is the item at the right level, in terms of the expected ability level and year level?
- Is the test material interesting?
- When a unit includes more than one item, are there dependencies between the items? Does one item give a clue to the next one? Would a different order of items within a unit make a difference? If a response to one item is incorrect, does this affect possible responses to other items in the unit?
- Is the item likely to be biased; is it likely to be easier or harder for certain subgroups in the test population for reasons other than differences in the ability being measured?
- Are there any ‘tricks’ in the item that should be removed?
- How will the students perceive the test material? To answer this, the panel members must imagine the cognitive, cultural and response format demands of the items from the point of view of test-takers.
- If the item is multiple-choice, are the incorrect choices – the distractors – indisputably incorrect, while being reasonable and plausible? Is the correct answer – the key – indisputably correct, and not simply the best of the alternatives presented? Are the alternatives of similar length and written in a similar style to the key?
- Do test materials reflect cultural sensitivity and avoid potential biases?
- Do items relate to the national assessment framework?
- Are items appropriate from a local perspective; do they assess knowledge, skills and understandings that local curricula would expect students to have developed by the May test date?

Following each review, revisions are made and national stakeholders recheck the revised items. The test developers may then ‘pilot’ specific items with groups of students to explore how students interact with them.

**Item trialling**

ACER had the contract to trial test items for NAPLAN 2008 and has recently conducted a trial of items for the 2009 tests in 360 schools across Australia.
In this process, at least twice the number of items required for the final tests are trialled in schools. Multiple-choice items are then marked by computer. Other items which require single word answers also are computer marked using optical character recognition, and any response that the computer interprets as incorrect is checked by a human marker. The writing tasks are marked by teachers experienced in the marking of student writing.

A team of ACER psychometricians analyses the data from the trial, establishes the difficulties of the trialled items, compares these difficulties with the abilities of the students in the trial and produces statistical reports on the items. Items are eliminated from the item pool if they have unacceptable psychometric properties.

ACER test developers then identify the best items and assemble a set of proposed test papers which are submitted to the national stakeholders for approval and subsequent sign off. For NAPLAN 2009, ACER is coordinating the national review of all test items.

Data analysis and reporting

Following the administration of NAPLAN across Australia in May 2008, ACER was contracted to conduct the central analysis of students’ test performances. ACER psychometricians analysed the test results, constructed the NAPLAN scales on which student results were to be reported, and supplied the states and territories with the information they required to prepare reports for individual students and schools. ACER also is preparing results in a form appropriate for public reporting and inclusion in a national report on students’ literacy and numeracy levels.

The NAPLAN tests are the result of an iterative process of development by teachers who are expert in test construction; scrutiny by curriculum and measurement experts; piloting and trialling with students; expert marking; and psychometric data analysis and reporting. ACER’s involvement has contributed to a high-quality, nationally-comparable snapshot of how Australian students are performing in these key areas of the school curriculum.

More information can be found at www.naplan.edu.au
International mathematics and science study shows mixed results for Australia

Sue Thomson outlines the key findings from the Trends in International Mathematics and Science Study 2007 and identifies some areas where Australia could do better.
The Trends in International Mathematics and Science Study (TIMSS) collects educational achievement data at Year 4 and Year 8 from countries across the globe. TIMSS is the world’s longest running mathematics and science study and one of the world’s most influential global assessments of student achievement in maths and science. Carried out every four years, TIMSS provides data about trends in mathematics and science achievement over time.

TIMSS 2007 was the fourth in this cycle of internationally comparative assessments, with earlier assessments conducted in 1995, 1999 and 2003.

With more than 60 participating countries and 425,000 students assessed, TIMSS 2007 also was the largest study of student maths and science achievement in the world.

In Australia, a nationally representative sample of more than 8,000 students in 457 schools participated in the main sample of the TIMSS assessments in late 2006. In addition, an extra sample of Indigenous students in all participating schools was collected to provide a more detailed examination of the achievements of Australia’s Indigenous students.

The release of findings from each cycle of TIMSS is eagerly anticipated and the release of the Australian national report by ACER in December 2008 was no exception. The results show that while Australian students’ results in Year 4 mathematics improved since 2003, achievement levels remained essentially static in Year 8 mathematics and Year 4 science, and declined significantly in Year 8 science.

One of the great strengths of TIMSS is the ability to monitor progress in educational improvement over time. Such trend information is crucial in helping policy makers understand the impact of decisions about investment in education, curricular reform, and initiatives to improve instruction. The TIMSS 2007 results show that at the Year 4 level, in both mathematics and science, more countries showed improvement than decline. At the Year 8 level, the pattern was less pronounced. Although close to a dozen countries showed improvements, most countries either showed little change or declined.

For Australia, the TIMSS results suggest an overall maintenance of performance over time. However, other countries, including England and the United States, have progressed since 2003. The Russian Federation and Slovenia have also shown strong improvement since the last administration of TIMSS. Both of these countries have undergone recent system and curricular reform.

International benchmarks

TIMSS 2007 measured student performance internationally at four benchmarks: advanced, high, intermediate and low. The proportion of Australian students achieving results at the advanced international benchmark set for TIMSS fell well short of the leading Asian nations. Countries such as Singapore, Hong Kong, Chinese Taipei, Japan and Korea showed exceptional performance at the high end of achievement. In Singapore, for example, more than 30 per cent of students in each category achieved the advanced benchmark. In contrast, less than 10 per cent of Australian students in each category performed at this level.

At the opposite end of the scale, less than five per cent of students in Chinese Taipei, Japan and Korea failed to reach the lowest benchmark in each category. In Australia, between seven and 11 per cent of students failed to meet the lowest benchmark. Australia’s performance at the lowest end of achievement is about the same as the international median for Year 4 maths and Year 4 science, and better than average internationally for Year 8 maths and Year 8 science; however, this still represents a significant proportion. **Sue Thomson is Principal Research Fellow in ACER’s National and International Surveys research program**
Key findings about Australia’s performance in TIMSS 2007

Year 4 mathematics
Australian students’ average scores in Year 4 mathematics have increased significantly by 17 points since 2003. In terms of relative position internationally, Australia was again outperformed by all of the Asian countries as well as England and the United States – a similar position to that obtained in 2003.

Year 8 mathematics
The result for Australia is similar to 2003 but achievement scores have decreased since the first administration of TIMSS in 1995. Increases in scores achieved by students from England, the United States, Lithuania and the Russian Federation, in combination with a decrease in Australia’s score, resulted in those countries significantly outperforming Australia in 2007. Overall, Australian students performed poorly in the areas of geometry and algebra.

Year 4 science
Australia’s performance has remained relatively unchanged since the first administration of TIMSS in 1995. Australia’s relative position compared to other countries is much the same in 2007 as it was in 2003.

Year 8 science
Australia’s average score has declined by 12 score points since TIMSS 2003. This combined with significant improvements by the Russian Federation and Slovenia has moved Australia a little downwards in relative terms.

Indigenous students
Once again the results of an international study highlight that little has changed in regard to educational outcomes for Indigenous students. At Year 4 the average score for Indigenous students in both mathematics and science was around 90 score points lower than that of their non-Indigenous counterparts. This gap has actually increased over time. Similar results were found at Year 8.

Gender
In Australia, boys generally outperformed girls in both Mathematics and Science at each year level. This is in contrast to the international trend for girls to outperform boys.
of students who are failing to reach the minimum standards in maths and science as defined by the international benchmarks.

In Australia, in each category, the greatest proportion of students achieved in the intermediate range. These results show that, overall, Australia is doing a very good job at educating students to an average standard. However, we need to ask ourselves: in an increasingly competitive global economy, is average good enough?

In addition to assessing students’ knowledge of mathematics and science curricula, TIMSS collects a rich array of background information about mathematics and science curriculum coverage and implementation, as well as teacher preparation, resource availability and the use of technology. This background data can help us to identify areas of the curriculum and teacher preparation that may require attention.

Curriculum reform
TIMSS 2007 shows that at both grades, students with higher achievement in mathematics and science had more positive attitudes toward these subjects, reported a higher level of self-confidence in learning mathematics and science, and placed a higher value on them as important to future success. These findings are consistent with information on student engagement from other international surveys. According to 2006 results from the Organisation for Economic Cooperation and Development’s Programme for International Student Assessment (PISA), Australian students are less interested in science and less concerned about environmental issues than students from other countries. A little more than half of the students surveyed for PISA indicated that science was very relevant to them while fewer than half were happy doing science problems and reading about science.

The findings from TIMSS 2007 suggest that urgent reform of primary and junior secondary science curriculum and teaching is needed. Of particular concern is the Australian students’ relatively poor performance in several key areas of maths and science, particularly algebra and geometry and physics and chemistry. Increasing students’ interest in science and mathematics must be a priority.

Teacher preparation
The TIMSS findings also highlight teacher preparation for science and maths subjects as an area in need of attention. Most Year 8 teachers had studied mathematics or science and reported feeling very well prepared to teach the topics in the TIMSS assessment. In contrast, Grade 4 teachers reported little specific training or specialised education to teach the TIMSS assessment topics, especially in science. Just half of the Australian Grade 4 students who took part in TIMSS 2007 had teachers who reported feeling very well prepared to teach the TIMSS science topics.

Conclusions
Overall, while Australia’s performance in TIMSS 2007 does not indicate a major decline, it does highlight a range of areas for improvement. In primary and junior secondary science and maths, we need to find ways to increase the amount of teaching expertise available in schools, increase the small amount of time given to the teaching of science and maths, and implement curricula that enable classroom teachers to demonstrate in engaging and meaningful ways the application of science and maths to the phenomena that students encounter in their lives.

The report, **TIMSS 2007: Taking a closer look at mathematics and science in Australia** by Sue Thomson, Nicole Wernert, Catherine Underwood and Marina Nicholas, is available for download from the ACER website at www.acer.edu.au
An ACER study of young Australians’ perceptions of the career advice received in secondary school has found that almost all students accessed career advice between Years 10 and 12 and believed the information provided met their individual needs. Kylie Hillman describes the study and its findings.

Kylie Hillman is a Research Fellow with ACER’s Transitions and Post-School Education and Training program.
Since the 1980s there have been dramatic rises in the number of young Australians completing Year 12. Over the same period there have been changes in the diversity of programs that schools offer to students as they have attempted to cater to the needs of students with differing career aspirations. With a wide range of choices on offer from traditional high school programs to TAFE and apprenticeship courses, decisions can be baffling for young people and career advisors play an important role.

Previous research in the Longitudinal Surveys of Australian Youth (LSAY) has stressed the importance of providing students with quality careers advice during their secondary school years to help ensure that they make informed decisions about course choices and the impact poor choices can sometimes have on future career prospects.

This latest LSAY study, published in October 2008, found that the vast majority of young people had participated in some type of careers advice program in school and they had been generally satisfied that the advice had met their individual needs. It also concluded that a school’s career advice program needs to encompass as many career advice activities as possible.

The study was based on information collected from a group of more than 8000 young Australians who had been 15-years-old in 2003. Most were in Year 10 at that time. Information on how much career advice they received and their perceptions of the usefulness of that advice was collected through annual phone interviews from 2003-2005.

Four major questions guided the study:
1. How widespread is the provision of career advice in Australian schools?
2. How useful do students in Australian schools find this advice, and what types of advice appear to be most useful?
3. Are there some types of student who find career advice more useful?
4. Is there a relationship between perceptions of career advice and school-based measures?

Seven types of career advice activity were identified and the study’s participants were asked if they had participated in one or more of these activities and for their perceptions of the usefulness of the activity. The activities considered were:
- listening to a talk from the school’s career advisor;
- receiving hand outs or written material about careers;
- taking part in a group discussion about careers;
- speaking individually to the school’s career advisor;
- looking online for career guidance or advice;
- listening to a talk by an employer representative; and
- listening to a talk by someone from a TAFE or university.

Almost all students were found to have taken part in at least one type of career advice activity across Years 10, 11 and 12. Most activity occurred in Year 10, when 99 per cent of students accessed at least one of the activities. On average, Year 10 and Year 12 students reported accessing five different types of activity, and Year 11 students reported four out of seven selected activities.

The most common type of career advice activity was the distribution of written material and handouts. In Year 10, 95 per cent of students received such material. This was followed by a talk from the school’s career advisor, with 87 per cent of students reporting this activity. Just over half of Year 10 students (54%) reported having a talk from a representative of a TAFE institution or a university. By contrast, 76 per cent of Year 12 students reported this activity.
Those surveyed were generally positive about the value of the career advice they received at school, although some types of advice were seen as more useful than others. In Years 10, 11 and 12, an individual conversation with the career advisor was considered most useful. Group discussion was seen as the least useful by students at all three year levels.

Two groups of students – those who were unsure about whether or not to complete Year 12 and those who were lower academic achievers – appeared to have most appreciated the career advice they had received.

The relationships with academic achievement – as measured by students’ performance on the 2003 administration of the OECD Programme for International Student Assessment (PISA) tests in mathematical literacy, reading literacy, scientific literacy and problem-solving skills – was statistically significant, with lower-achieving students reporting that career advice was more useful, although the contribution of this factor was very small.

Young people who were unsure about whether they would complete Year 12 also had more positive comments about career advice. These findings indicate that career advice programs are valued by young people who are more vulnerable when making the transition from school, and that career advisors should continue to provide support to these young people.

The influence of a number of background factors such as gender and socio-economic status on how useful students perceived career advice at school was extremely small. This is a pleasing finding as it indicates that career advice is being delivered equitably to students across all schools and within schools. Regardless of their background, students see career advice as useful and believe the advice they receive at school meets their particular needs.

One of the strongest associations was between perceptions of the usefulness of career advice and the number of career advice activities during the year. As young people participated in more activities, they found career advice overall to be more useful. This underlines the importance for career advice programs to offer students a variety of activities.

The study concluded that almost all students obtain career advice between Years 10 and 12 and believe the information provided met their individual needs. Students have different needs from career advice and these needs can change over time, which indicates that breadth in programs is important. Young people appear to appreciate a wider variety of activities in their career advice program as it may provide them with more opportunities to find a career they wish to pursue.

Further information and additional findings are available in the report, Career Advice in Australian Secondary Schools: Use and Usefulness, by Sheldon Rothman and Kylie Hillman. The study is research report number 53 in the Longitudinal Surveys of Australian Youth (LSAY), a program funded by the Australian Government Department of Education, Employment and Workplace Relations (DEEWR) with support from state and territory governments. The full report can be downloaded free-of-charge from the ACER website at www.acer.edu.au.
**Varying pay-offs to post school education and training**

Social background plays only a small role in accounting for differences in occupational status and earnings at age 24, indicating that education is enhancing social mobility, according to a recent ACER study from the Longitudinal Surveys of Australian Youth (LSAY).

The study, released on 20 January 2009, found that, in general, post-school education and training leads to higher status occupations and higher earnings, compared to not doing any further study or training. However, not all forms of post-secondary education and training are equally beneficial.

Further information and additional findings are available in the report, *The Occupations and Earnings of Young Australians: The Role of Education and Training* by Gary N. Marks. It can be downloaded from the ACER website at [www.acer.edu.au/lsay/research.html](http://www.acer.edu.au/lsay/research.html)

**Masters reviews Queensland primary school education**

Queensland Premier Anna Bligh announced on 10 December 2008 that ACER’s chief executive, Professor Geoff Masters, had been appointed to review curriculum and educational standards for Queensland primary school students. Ms Bligh said in a media statement that the review would target areas of core literacy, numeracy and science. Professor Masters presented preliminary findings of his review in late January with a final report to follow in April 2009.

**Accountability and transparency key to education quality**

The latest in a series of policy papers released by ACER, *Output Measurement in Education*, by ACER Principal Research Fellow Dr Andrew Dowling, argues that an approach that measures educational ‘outputs’ through student, school and teacher assessment is needed to ensure accountability in the education system.

The policy paper, released in January 2009, shows that despite massive spending on education by the world’s governments, totalling $2 trillion in 2006, performance has barely improved in decades. Funding does not often correlate with performance, and therefore educational quality must be measured by other means.

The paper considers the effectiveness of accountability processes, particularly standardised tests of student performance, and corresponding rewards and sanctions based on performance indicators.

While the paper urges increased measurement of performance and transparency of information, it does not advocate rewards and sanctions based on performance.


**Vale Professor Peter Karmel**

ACER staff were saddened by the recent passing of former Chair of the ACER Council, Professor Peter Karmel, AC, who died on 30 December at the age of 86.

Professor Karmel played a very significant role in the history and development of ACER. He was a member of ACER Council for more than 30 years, from 1968 to 1999, and Chair of the Council from 1979 to 1999.

During the thirty years in which he was associated with ACER, Professor Karmel worked with four of ACER’s five chief executives (Bill Radford, John Keeves, Barry McGaw and Geoff Masters) and was directly involved in the appointment of three.

**Four universities take part in national student aptitude test trial**

ACER has been contracted to conduct stage two of the Federal Government’s pilot National Student Aptitude Test for Tertiary Admission (SATTA). ACER will supply uniTEST for 2009 and 2010 entry.

Four universities, Flinders University, The Australian National University, Macquarie University and the University of Ballarat recently held test sessions. Enquiries have been received from a number of other universities considering the program for 2010 entry.

The Department of Education, Employment and Workplace Relations (DEEWR) will subsidise universities’ participation in the pilot by providing funding for universities to test up to 20,000 students, as well as providing up to $10,000, for each university, to promote the scheme.

uniTEST assesses candidates’ ‘generic reasoning and thinking skills, which are considered necessary for successful university study. The results are then combined with their academic achievement scores to help determine their suitability for university study.

Further information about uniTest is available on the ACER website at [http://unitest.acer.edu.au/](http://unitest.acer.edu.au/)

**Australasian Education Directory 2009**

The 2009 edition of Australasian Education Directory is now available. The AED is a comprehensive directory of educational organisations and personnel in Australia and New Zealand revised annually. The AED includes:

- Names and contact details of key personnel in Australian and New Zealand education
- Ministries, departments and education authorities, and non-government authorities
- All universities/higher education institutions
- All TAFE colleges, polytechnics and VET institutions
- Indigenous education in Australia and New Zealand
- Adult, community and migrant education
- Early childhood education
- Professional, curriculum, research and special interest groups and associations

The AED can be ordered from ACER Press Customer Service by phone on 1800 338 402 (Toll Free) or email sales@acer.edu.au or online from [www.acerpress.com.au](http://www.acerpress.com.au)

**New sponsor for Database of Research in International Education**

IDP Education Pty Ltd is to provide ACER with funding to maintain the Database of Research in International Education (DRIE) and continue to populate it with new material. As a result, this searchable database will continue to be available to researchers as a tool to help them locate books, articles, conference papers and reports on international education which are published both in Australia and overseas.

The searchable web database currently contains details of 7,677 pieces of research published from 1990 onwards. The
A group of four Indian educators visited the ACER International Institute in September and October under the Australian Endeavour Scholarship program. The scholarships, funded by the Australian Department of Education, Employment and Workplace Relations, were awarded through the Australian High Commission in Delhi. The Indian educators worked with ACER International Institute staff to study school-based and system-wide student assessment practices in Australia over six weeks in Melbourne, Sydney, Adelaide and Brisbane. They visited schools and talked with leaders and teachers about the administration and use of student assessment.

Why not the Best Schools?

Why not the best schools? What we have learned from outstanding schools around the world, by Brian Caldwell and Jessica Harris was launched by Professor Glyn Davis AC, Vice-Chancellor, the University of Melbourne, on 30 October, 2008. Why not the Best Schools? offers a ten-point, ten-year plan for an education revolution that will result in the transformation of Australia’s schools. The book draws on a five-year study culminating in the International Project to Frame the Transformation of Schools conducted in Australia, China, England, Finland, the United States and Wales. There are 6 Case Study books, sold separately and they are available online from ACER Press at www.acerpress.com.au.

New location for ACER Brisbane office

ACER’s Brisbane office has relocated to Kelvin Grove from Spring Hill. The new premises include a shop where books and other products published and distributed by ACER Press are available for sale directly to the public. The new office and shop are located at 1/165 Kelvin Grove Road, Kelvin Grove, QLD 4059. Phone (07) 3228 9000 Fax (07) 3228 9001.

ACER International Institute hosts Indian educators

The English Language Skills Assessment (ELSA) is a secure web-based test of English language proficiency that provides instant feedback to teaching staff on the nature of the teaching support required. ELSA was developed under commission to assess the English language skills of tertiary students entering degree or TAFE courses. The test has been piloted successfully with three universities.

For further information log on to www.acer.edu.au/elsa/index.html

CEET 12th Annual National Conference

The 12th annual national conference of the Monash University-ACER Centre for the Economics of Education and Training was held at Ascot Vale, Melbourne on 31 October. The conference theme was The Expansion of Education and Training: Ensuring relevance, quality and inclusion. ACER’s Research Director, Transitions & Post-School Education & Training, Dr Phillip McKenzie, presented a paper in which he argued that the current economic crisis has the potential to reverse, or at least slow down, the growth of international student numbers in Australia. Dr McKenzie’s paper, along with some others presented at the conference, are available from www.education.monash.edu.au/centres/ceet/conferences/2008.html

Participation in science and mathematics

A report by ACER has confirmed that Australia faces significant challenges in boosting participation in science and mathematics studies in school education, university studies and in the teaching workforce.

The report, Participation in Science, Mathematics and Technology in Australian Education, by John Ainley, Julie Kos and Marina Nicholas was published in late October 2008 as ACER Research Monograph 63. The report was commissioned by the Australian Government Department of Education, Employment and Workplace Relations to update and extend the Background Data and Analysis component of the 2003 report Australia’s Teachers: Australia’s Future – Advancing Innovation, Science, Technology and Mathematics to include new data that have been published or become available since its publication. The report is available from www.acer.edu.au/research_reports/monographs.html

Readership Survey

Thank you to readers who responded to the Research Developments readership survey following the publication of the Winter 2008 edition. Five $100 gift vouchers for products available through ACER Press or the ACER Bookshop were on offer to survey participants. The draw took place on 1 December 2008. Congratulations to our five prize draw winners and thank you to everyone who took part. Your feedback is appreciated.

And the winners were...

Mr A. Dunne, ACT
Ms K. Bates, New South Wales
Mr B. Cumming, New South Wales
Ms B. May, South Australia
Mr S. Fitzpatrick, South Australia
Why not the Best Schools? provides an in-depth account of how transformation occurs in schools. Fifty indicators are provided to help shape strategies for policy makers and practitioners in schools and school systems. Guidelines for leadership and governance ensure a future-focus for those who are determined to ensure that all students will succeed in the twenty-first century.

Brian Caldwell & Jessica Harris | $39.95

How to Get Your School MOVING and IMPROVING

Steve Dinham

Moving and Improving is aimed at professionals at any stage of their career seeking to improve teaching and learning. This book highlights relevant research from educators and students in many schools across a variety of countries, along with short case studies and vignettes to add detail, richness and authenticity.

Steve Dinham | $39.95

Teaching Methods explains the different theories of teaching and learning, together with their underlying principles and methods. It defines the role of a teacher in the learning process and looks at the latest research on what contributes to effective practice.

Peter Westwood | $24.95

Working Together explores how to effectively teach students with a language learning disability (LLD) by combining knowledge derived from two important areas: curriculum development, and cognitive and strategy instruction.

Mandy Brent & Chris Millgate-Smith | $59.95

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