

# Teachers for the Future

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The Review of Teaching and Teacher Education was an initiative under the Australian Government's \$3 billion innovation statement *Backing Australia's Ability* with the purpose of identifying 'strategies which will increase the numbers of talented people who are attracted to teaching as a career, especially in the fields of science, technology and mathematics education, and build a culture of continuous innovation at all levels of schooling in Australia'. The Review Committee was established by the Minister for Education, Science and Training, Dr Brendan Nelson, on 8 August 2002, and oversaw the Review process to its completion in the final report last October, with the title, "Australian Teachers: Australia's Future –Advancing Innovation, Science, Technology and Mathematics".

This paper looks at kinds of teachers we will need to have for the future by, first, briefly giving some background about the review process; secondly, providing an indication of the responses that the Review's final report evoked; then commenting on the outcomes and key issues in the Review; and finally, to identify what I see are the matters which need to be addressed carefully in bringing about 'teachers for the future'.

## Background

The Review Committee, which I chaired, had a committee of 12, a reference group of 25, and a secretariat of 7. We were given seven terms of reference. We were told to build upon comprehensive studies on teacher supply and demand undertaken that had been previously undertaken by the then Commonwealth Department of Education Training and Youth Affairs. We had to describe the teaching skills required to develop a culture of lifelong learning and innovation among Australia's school students. We were asked to explore the impact of innovative pre-service and in-service education programmes on the development of teachers' pedagogic practices to enhance students' appreciation and capacity for learning, creativity and innovation, with particular emphasis on the fields of science, technology and mathematics. After assessing what were the current skills, we were to propose strategies for equipping teachers with the knowledge and skills to create an innovative student learning culture, and examine leadership practices that attract and retain teachers, especially in the areas of science, technology and mathematics. In practical language, what the Government was really looking for, from the Review Committee, was outlined in the last two terms of reference. What we were expected to produce, at the end of the day, was a report on strategies to attract and retain science, technology and mathematics teachers, and an action plan will encapsulate a shared understanding of the school exit outcomes necessary to equip school graduates for the knowledge economy and learning society.

The final report of the Review Committee delivers on all those terms, and comprises three volumes: an Agenda for Action (56 pages), a Main Report (280 pages), and Background Data and Analysis (80 pages).<sup>1</sup> It is the culmination of a fourteen month investigation which had earlier produced two Discussion Papers and an Interim Report.<sup>2</sup> A first submission phase was undertaken in September and October 2002

following the release of the first Discussion Paper, *Strategies to Attract and Retain Teachers of Science, Technology and Mathematics*. The Interim Report, *Attracting and Retaining Teachers of Science, Technology and Mathematics*, published in February 2003 took cognisance of this first group of submissions including some stories of teacher's experience, which I refer to later on. A second submission phase followed the release of the second Discussion Paper, *Young People, Schools and Innovation: towards an action plan for the school sector*, in March 2003. Altogether the Review Committee received and analysed over 240 submissions, visited government and non-government school authorities in all states and territories, commissioned a variety of studies, and met a range of stakeholders and interest groups.

## **Responses**

The Minister described the work as “a landmark Report”, saying “The Australian Government will be considering the recommendations in the Report most seriously, particularly in relation to the training of teachers, the financial relationship between teacher training and employment of teachers, and especially the quality initiatives, many of which the Government has already undertaken.”<sup>3</sup> Opposition Shadow Minister Jenny Macklin began a media release with the sentence, “The Report into teacher quality by Professor Kwong Lee Dow is a ringing endorsement of Labor's Policy to address the future teacher shortage particularly in maths and science.”<sup>4</sup>

The media has highlighted the priority attached to retaining in schools the teachers already trained. “New teachers bail out early,” was the Age headline (10 October 2003), while the Courier Mail (17 October 2003) published an analysis by Christopher Bantick called “Stem the Exodus”.<sup>5</sup> They quote “Anecdotal evidence suggested that up to 25 percent of teachers left the profession within five years of teaching.”<sup>6</sup> While the Canberra Times (10 October 2003) noted “in both government and non-government sectors more teachers resigned than retired from service in 2001.”<sup>7</sup> Another topic was headlined under “Top teachers merit top pay” (Australian 17 October 2003) and “Pay teachers on merit: Report” (Sydney Morning Herald 10 October 2003).<sup>8</sup> They quote “Progressively, teacher career and salary advancement should come to be based on merit and teaching performance rather than length of service, with accomplished teachers rewarded at higher rates.”<sup>9</sup>

Jim Cumming, Executive Director of the Australian College of Educators is quoted saying “Establishment of a credible system of voluntary national professional certification is the next step in this process, but will require new ways of thinking and operating on the part of all stakeholders.”<sup>10</sup> The Australian Science Teachers' Association was cited in the media as feeling that “many of the proposals supported their own push to recognise and promote excellence in teaching, and to encourage greater collaboration” and were pleased “to see recommendations that pertain to professional standards.”<sup>11</sup>

## **Review's Outcomes and Key Issues**

*Building a culture of continuous innovation*

A key issue now is Australia's capacity to foster innovation. Australia's ability to prosper in the new global economy depends on high levels of R&D. Australia needs to mobilise its human talent to foster scientific discovery, creativity, inventiveness and the ability to produce needed goods and services, be they material products, services, or practical ideas. Sustained innovation is the key to future growth and prosperity in a competitive global economy. These in turn require that more young people achieve scientific and technical qualifications with a strong base in the physical and biological sciences and mathematics. There is also an increasing demand in all occupations and in the community generally for well-educated, creative and enterprising people who communicate well, show initiative, work effectively together and demonstrate high levels of competence and responsibility. These and other attributes of lifelong learning are identified in the *Adelaide Declaration on National Goals for Schooling in the Twenty-first Century* (National Goals for Schooling).<sup>12</sup>

Building a culture of continuous innovation through education is an essential. Innovation refers to a collective and individual capability to turn research based knowledge into products and services of economic, social and cultural value. Different emphases in knowledge and skills are called for, particularly links between scientific and mathematical knowledge and technological capability. For individuals, groups, companies and businesses, and societies to be innovative, calls for a wide variety of attributes in people and conditions in society.

People are at the heart of innovation. As Catherine Livingstone, Chair of Australia's leading science and industrial research organization has reminded us recently:

The innovation system is replete with interdependence and causal loops, but the key to its success is the linkage between the nodes and these linkages are forged by people, not by institutions. We do need institutions to provide the frameworks, but people are the enablers of innovation. They have the working relationships, the curiosity, the passions and the ideas. For innovation to occur, these people must be allowed to take risks and make mistakes – even to fail.<sup>13</sup>

Where societies and their economies are focused on knowledge, and therefore on innovation, schools and universities and education systems become critical. Teachers are the key to mobilising schools for innovation. Australia has nearly ten thousand schools, with a quarter of a million teachers who have responsibility for the learning of three and a quarter million students.

#### *Supply of Teachers: Three main challenges*

The supply of teachers has been broadly adequate to meet school needs nationally but there are challenges which show deficiencies in the type and balance of supply which severely undermine Australia's capacity to foster innovation. In particular we can identify three main challenges: specific recruiting difficulties, under-representation in important cultural traditions, and gender bias.

There are recruiting difficulties for certain secondary specialisations—including physics, chemistry, mathematics, technology studies and languages other than English (LOTE)—and in many rural and remote and some metropolitan locations. Targeted

policy initiatives, including financial incentives, will be required to attract and retain teachers, especially of science, technology and mathematics.

**Table 3.6: Secondary teacher shortages, 2002**

Specialisation	AUST	NSW	VIC	QLD	SA	WA	TAS	NT
Manual arts/tech studies*	N	S	S*	S	S			
Maths	N	S	S	S	S		R	S
Physics/chemistry	N	S		S	S		R	S
General science	N	S	S	S			R	
Music			S					
LOTE*			S*	S	S			
Home economics					S			
Information technology			S	S				
Senior English							R	
Special needs					S			
Agricultural science				S				
Physical Education			S					

1. Not all occupations assessed in all States.

\* = Shortages are for specialist skills, see comments below.

N = National shortage S = State-wide shortage.

M = Shortage in metropolitan areas R = Shortage in regional areas.

RD = Recruitment difficulties in regional areas D = Recruitment difficulties.

MD = Recruitment difficulties in metropolitan areas.

Source: Australia's Teachers: Australia's Future, Advancing Innovation, Science, Technology and Mathematics. Main Report; Department of Education, Science and Training, October 2003. p. 80

The 2003 National and State Skill Shortage Lists produced by the Department of Employment and Workplace Relations (DEWR) indicate that there were national shortages in the second half of 2002 in the following secondary subject areas: manual arts, maths, physics/chemistry and general science. While DEWR does not quantify the extent of identified shortages, they are very similar to those areas identified by MCEETYA.<sup>14</sup> According to Professor Alison Elliot at the University of Canberra: '... many schools in hard-to-staff areas cannot get [mathematics], science, technology or ICT teachers. Some manage to obtain teachers who would not be acceptable in more affluent areas because of their poor training, poor spoken English skills, and poor classroom management skills. Many of these teachers are teaching in schools where students are from non-English speaking backgrounds, further compounding learning problems for students.'<sup>15</sup> Smaller class size and multi-level classes in many regional and remote areas can also work against the employment of specialist mathematics, science and technology teachers in those areas.<sup>16</sup>

Prospective teachers from Indigenous and other groups at present are poorly represented in teaching. They will need to be recruited to achieve a better correspondence with the diversity of students. Along with remote rural regions, there is a category of difficult-to-staff schools in some locations within metropolitan areas, generally either inner-city or outer metropolitan fringe. In these areas there are students from low socioeconomic groups and non-English-speaking backgrounds. While teachers may not need physically to uproot themselves from their home and

community to teach in such schools, the conditions of teaching can be often regarded as particularly difficult and unappealing, and teachers frequently seek to move when the opportunities arise. Thus, these schools suffer from high teacher turnover; they also tend to have poorer facilities than other metropolitan schools as the parent body is less able to command supplementary resources for the school budget. Student behavioural difficulties and lack of parental support for teachers are often cited as further disincentives for teachers to remain at difficult-to-staff metropolitan schools.

Prospective Indigenous teachers need to be attracted to the profession in greater numbers. Such teachers serve as role models, infuse a broader range of cultural perspectives into schools, and bring a capacity for closer rapport and identification with students from Indigenous backgrounds. The School of Education, James Cook University notes the importance of teachers' understanding, through experience with the community, of community needs: '... in a culturally diverse regional community, with low retention and participation rates, developing teachers' engagement in community activities is an important step in assisting them to recognise their potential to influence and bring about change'.<sup>17</sup>

A gender bias towards females is pronounced in the teaching profession, especially in the primary sector and in lower secondary schooling. The male teacher cohort is concentrated more heavily in the older age groups and it is mainly older males who teach upper secondary and advanced courses in science and mathematics. There has also been an increase in the proportion of female teachers, at both the primary and secondary levels.

**Table 22: Percentage distributions showing gender of teachers for 1963, 1979, 1989 and 1999**

Year	1963	1979	1989	1999
Male	48	43	39	35
Female	52	56	61	65

Source: Australian College of Educators (2002); Dempster et al. (2000); Logan, Dempster, Chant & Warry (1990); Bassett (1980).

Source: Australia's Teachers: Australia'sFuture, Advancing Innovation, Science, Technology and Mathematics. Background Data and Analysis; Department of Education, Science and Training, October 2003. p. 57

The profile of the teaching workforce is skewed towards females, a trend which has been steadily growing over the past 40 years. Females made up 52 % of the total workforce in 1963 but, by 1999, this had increased to 65 %.<sup>18</sup> Recent trends suggest that the female proportion of the teaching workforce will increase. The past decade has seen the number of FTE female teachers in Australian schools rise significantly (from 125 362 in 1992 to 151 647 in 2002), alongside a slight decline in the number of FTE male teachers (from 76 704 in 1992 to 73 706 in 2002).<sup>19</sup> This trend is present at both primary and secondary levels. The ratio of female to male teachers in primary schools in 1982 was 2.4:1, and rose to 3.8:1 in 2002. Among secondary teachers, the ratio increased from 0.8:1 in 1982 to 1.2:1 in 2002.<sup>20</sup>

*Science, technology and mathematics education: Five issues of national concern*

In science, technology and mathematics education there were five issues that the Review Committee felt are of national concern. The five issues are:

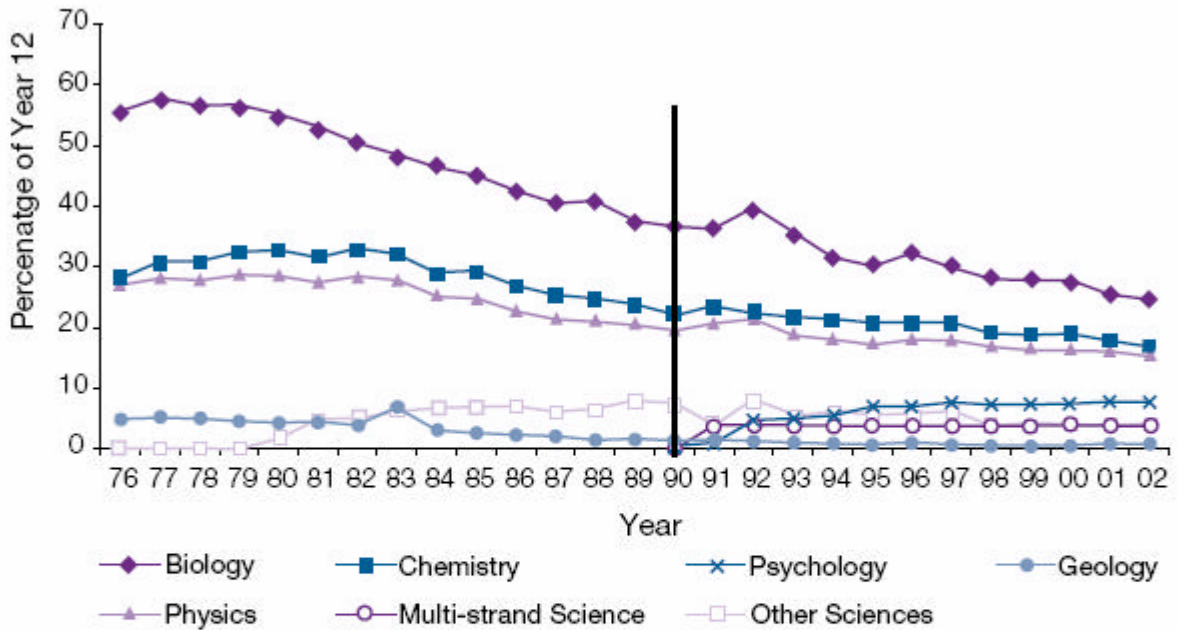
1. a declining proportion of students who complete Year 12 studies in physics, chemistry, biology and advanced mathematics;
2. the insufficient numbers of highly trained teachers in science, technology and mathematics;
3. present uncertainty among primary school teachers about how best to teach science, accompanied by primary teachers' relatively low levels of interest and academic attainment in science and mathematics;
4. concern about teaching which does too little to stimulate curiosity, problem solving, depth of understanding and continued interest in learning among students, or to thus do little to encourage them to undertake advanced study in science and mathematics at school and beyond; and
5. concern that some students who do not do well at school, including too many Indigenous students, and may leave at the minimum permitted age with low attainments and poor motivation for continuing learning.

From a consideration of all five issues the Review Committee also saw the need of two requirements. For all primary teachers there is the need to strengthen the content and pedagogical knowledge of science, technology and mathematics in initial teacher education and in professional development programs. For secondary teachers of science there is in addition a need to strengthen further pedagogical knowledge.

*Declining proportion of students in physics, chemistry, biology and advanced mathematics*

Too few are taking advanced mathematics, physics and chemistry in the senior school years, and in consequence, the proportion of university commencers in science, engineering, agriculture, health and architecture related course, though slowly increasing, are not keeping up with overall growth in university enrolments. Following historical highs reached in the late 1980s and early 1990s, there have been declines in the absolute numbers of students studying physics, chemistry and biology in Year 12. From 1991 to 2001 there was a decline of 25 % in biology enrolments, 21 % in chemistry enrolments, and 19 % in physics enrolments.<sup>21</sup>

**Figure 1: National participation rates among Year 12 students in science subjects from 1976 to 2002**



**Notes:** Data for the period 1990 to 2002 provided by DEST based on information provided from the assessment, curriculum and accreditation authorities in each jurisdiction. Data for the period from 1976 to 1989 taken from Dekkers et al. (1991). Percentages based on ABS Year 12 enrolment statistics: *Schools Australia* (Cat. No. 4221.0).

**Source:** Dekkers et al. (1991), DEST Statistical Collection and ABS: *'Schools Australia'* (figures taken from 1976 to 2002 publications) (Catalogue No. 4221.0) (2003a).

Source: Australia's Teachers: Australia's Future, Advancing Innovation, Science, Technology and Mathematics. Background Data and Analysis; Department of Education, Science and Training, October 2003. p. 4

At school level, Australian 15 year olds are among the highest performers in reading, mathematical and scientific literacy in international surveys. The OECD Programme for International Student Assessment (PISA) assessment (in 2000) showed Australia statistically significantly out-performed by only two countries in mathematical literacy (Japan and Hong Kong-China), and by only two countries in scientific literacy (Japan and Korea).<sup>22</sup>

This is encouraging, but no cause for complacency because:

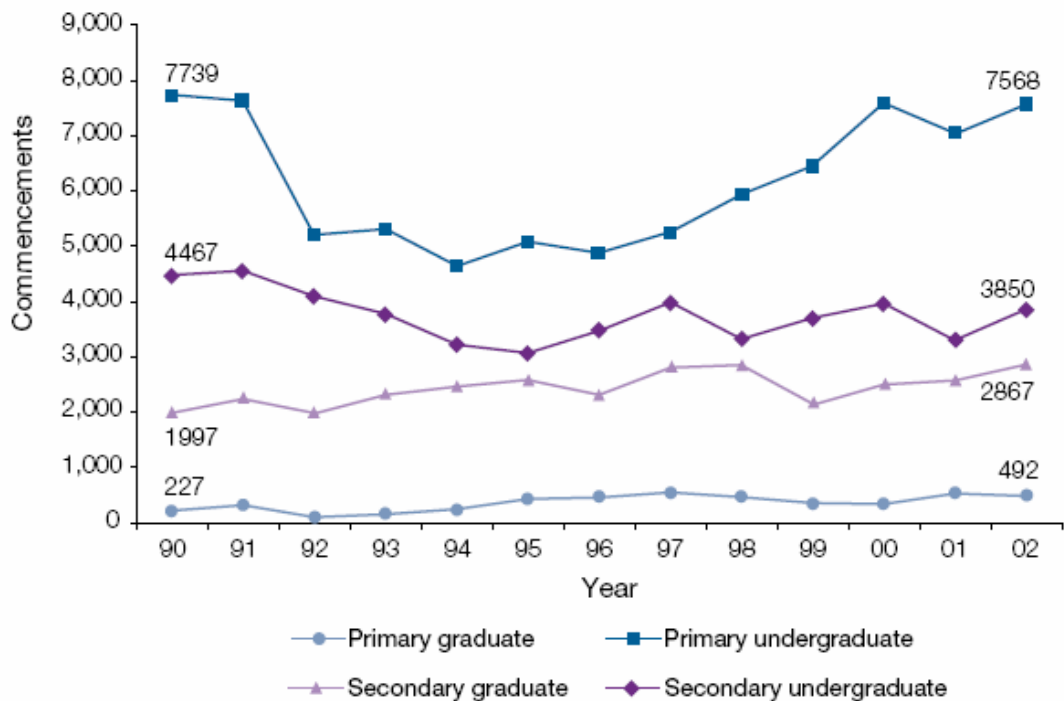
- while we do well on average, and the best do very well, there are considerable numbers who do not
- other countries are now making big commitments to improve (e.g. UK)
- many experienced teachers will retire in the coming decade (a peak in teacher retirements anticipated around 2006 to 2008)<sup>23</sup>

*Insufficient numbers of teachers in science, technology and mathematics*

The data available to perform detailed teacher supply and demand projections is inadequate; however, it is possible to conclude that there are emerging teacher shortages that will be more of an issue for secondary than primary schools. These shortages are likely to be greatest in the mid to latter part of the decade and greater in mathematics, science and technology. The 2003 MCEETYA report on teacher supply and demand estimated that, depending on the success of policy initiatives to attract and retain teachers, shortages of up to 20,000 to 30,000 teachers may occur later in the decade.<sup>24</sup>

Since 1995, there has been an increase in commencements in initial teacher education courses and, since 1999, an increase in the number of completions from those courses.<sup>25</sup> However, the increase has been higher in primary than in secondary programs, with a decline in the proportion of science and mathematics graduates entering initial teacher education courses.

**Figure 14: Commencing domestic students in initial teacher education courses from 1990 to 2002**



Source: DEST Higher Education Statistics Collection: Commencing Students Enrolled in Teacher Education Courses by Citizenship and Gender 1990 to 2002.

Source: Australia's Teachers: Australia's Future, Advancing Innovation, Science, Technology and Mathematics. Background Data and Analysis; Department of Education, Science and Training, October 2003. p. 38

There has been a decline in the propensity for graduates in mathematics and science to enter teacher education after graduation. Keep in mind that between 80 and 90 % of those qualifying to teach senior secondary chemistry and physics, and around 75 % of

those qualifying to teach advanced mathematics, do so through a graduate teacher education course following completion of an undergraduate degree.<sup>26</sup>

**Table 2.9: Course completions by secondary specialists by selected specialisations, 2001**

	Physics	Chemistry	Maths	English	ICT	LOTE	Other	Total
ACT	3	6	12	35	2	13	71	88
NSW	106	140	139	325	49	152	911	2102
NT	1	2	2	8	3	3	19	25
QLD	19	42	71	201	30	76	439	1091
SA	8	12	18	38	2	35	113	235
TAS	0	2	8	25	1	7	43	56
VIC	40	97	114	402	110	134	897	1548
WA	30	17	44	89	37	32	249	641
TOTAL	207	318	408	1123	234	452	2742	5786
% of Total	3.6%	5.5%	7.1%	19.4%	4.0%	7.8%	47.4%	100.0%

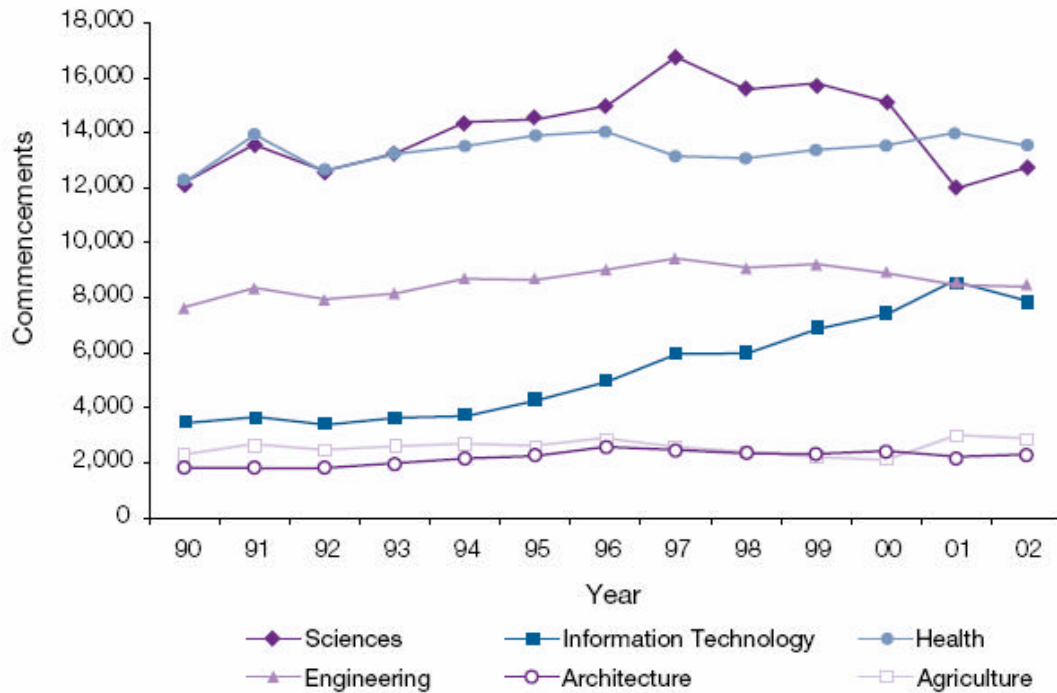
Source: R Ballantyne, JD Bain and B Preston, 'Teacher education courses and completions. Initial teacher education courses and 1999, 2000 and 2001 completions', Department of Education, Science and Training, 2003.

Source: Australia's Teachers: Australia's Future, Advancing Innovation, Science, Technology and Mathematics. Main Report; Department of Education, Science and Training, October 2003. p. 59

Based on initial teacher education course enrolment data for 2001 from Lawrance and Palmer, Ainley and Underwood estimated that 217 new mathematics teachers and 464 new science teachers would begin teaching in schools in 2002.<sup>27</sup> Since then, higher enrolments in science and mathematics, especially by career change entrants, have been noted by two institutions. At the University of Melbourne, for example, teacher education enrolments in secondary science, technology and mathematics methods increased by over 30 % from 2001 to 2002.<sup>28</sup>

We then see the difficulty extenuated in the fact that there have also been declines since 1997 in higher education commencements in the physical and natural sciences, and to a lesser extent engineering – placing Australia on this measure around the middle of OECD countries, well below the leaders, Sweden and Finland.<sup>29</sup> In 2002, 12,718 students commenced higher education studies in the field of science – 11% of all commencing students. Five years earlier, in 1997, 16,719 students commenced higher education studies in the field of science – 13.5% of all commencing students.<sup>30</sup>

**Figure 8: Trends in commencing domestic enrolments new to higher education in bachelor degree courses from 1990 to 2002**



Source: Australia's Teachers: Australia's Future, Advancing Innovation, Science, Technology and Mathematics. Background Data and Analysis; Department of Education, Science and Training, October 2003. p. 23

### *Untapped pool of potential teachers currently engaged in other professions*

There are three main sources of prospective teachers available to fill vacancies that occur:

- those who are newly qualifying as teachers through teacher education programs (who typically comprise around 70% of newly recruited teachers);<sup>31</sup>
- the overlapping pools of qualified teachers on employment lists for ongoing teaching jobs (estimated to be around 31,000 in 2002), and those available for relief or casual teaching (totalling an estimated 30 000–40 000 Australia-wide);<sup>32</sup> and
- more challengingly, other qualified teachers (an estimated 117,000 in 2001) who are working in other jobs throughout the economy.<sup>33</sup>

Many submissions strongly advocated that motivated and capable individuals from professional and technical backgrounds with an appropriate undergraduate degree, such as scientists contemplating career changes, are a potential source of teachers. The Hon Alan Cadby, Shadow Minister for Higher Education and Training in Western Australia, described this potential source:

There is an untapped pool of potential teachers currently engaged in other professions. Lawyers, engineers, scientists, accountants—with the changing face of the workforce and greater fluidity between employment markets, many workers qualified in these and other areas have shown an interest in becoming a teacher.<sup>34</sup>

Colin McFayden, a chemical engineer, was one of those untapped pool of potential teachers currently engaged in another profession:

I am a chemical engineer with 27 years experience. I have an industrial background using maths and science continuously. I have considered changing careers to teaching so that I can pass on my enjoyment of maths and science subjects. I would recommend that the transition from industry to teaching be made more attractive and easy to occur.<sup>35</sup>

The New South Wales Department of Education and Training noted that “There are already clear pressures on schools to call on a wider pool of experience and qualifications than previously required”.<sup>36</sup>

#### *Flexible pathways through teacher education*

Tapping this pool of potential teachers means flexible pathways through teacher education as a means of attracting people who might otherwise not enter teaching. Such pathways generally aim to do whatever any teacher education program does: convey good teaching practice; introduce teachers to classrooms; and provide an appropriate knowledge and skills base. In most cases, they are designed around mid-career professionals with industry or vocational experience. In addition, many are supported by State and Territory education authorities seeking innovative and flexible ways to attract people into teaching, such as by recognising prior learning and experience. In many ways, these pathways are a response to the needs of a more demanding labour market and changing lifestyle needs, and this was borne out through those submissions which supported more flexibility in the delivery of teacher education courses, particularly for mid-career entrants, as well as students in regional and rural areas who are generally only able to study via distance education.<sup>37</sup> Other possibilities include increased flexibility in course delivery through part-time and evening courses; flexibility in entry and exit points, and flexibility in the recognition of learning pathways.<sup>38</sup> At the University of Newcastle:

... the ‘Newstart in Teacher Education’ program has been introduced to retrain as secondary technical and applied studies teachers former industrial workers, providing appropriate recognition of prior learning for existing qualifications and experience. The program commenced on a full fee basis for former Newcastle BHP Steel workers, with BHP funding the students. The program is also operating at Wollongong operating at a school site.<sup>39</sup>

Many universities have recognised the need for flexible delivery of teacher education courses and are prioritising their development in line with approaches being applied across university courses more generally.

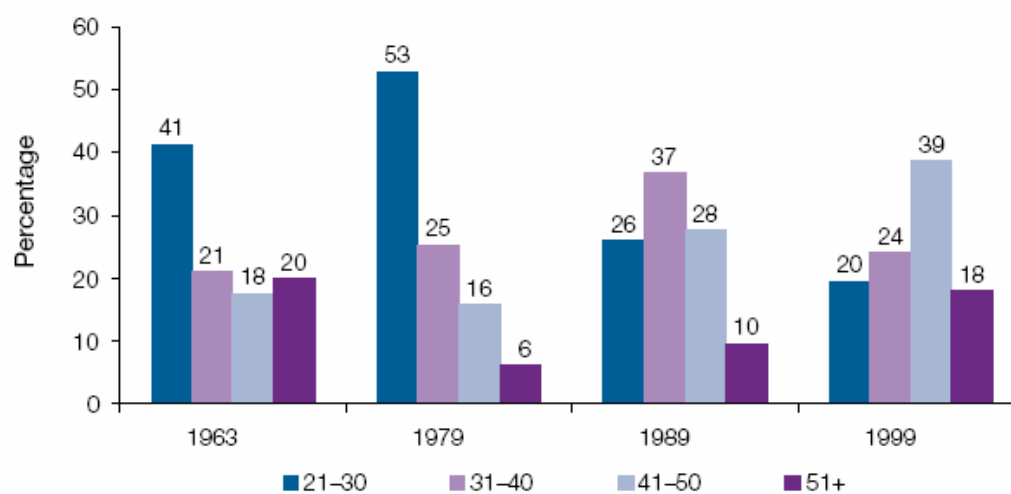
## Teacher Retention

Teacher retention in a highly competitive labour market is a serious challenge with many dimensions. It begins at the every start of process of producing a teacher. A 2002 Victorian report states that, for every 100 applicants for a place in a teacher education course, 56 received an offer, 41 enrolled, 31 were expected to graduate, 23 would be available for full-time employment as a teacher, and 15 ultimately would be employed as teachers in schools.<sup>40</sup> Once teachers are employed the issue of retention becomes quite serious. Some State and Territory education authorities have anecdotally reported high attrition rates early in teachers' careers.<sup>41</sup> This is possibly as high as 25% within the first five years of teaching.<sup>42</sup>

## Marginal Impact from Retirement

The option of early retirement has had some impact on teacher retention, but probably will not be such a significant factor in the future as may be expected. There has been a marked shift in the age profile of the teaching workforce over the last two decades, with a high proportion of teachers now over 45 years and fewer young teachers. That trend will result in a large increase in teacher retirements over the next few years. Over the 15 years to 2001, the median age of the teaching population rose from 34 to 43 years, and the percentage of teachers over the age of 45 years rose from 17% to 44%.<sup>43</sup>

Figure 18: Age distribution of teachers for 1963, 1979, 1989 and 1999



Sources: Australian College of Educators (2002); Dempster et al. (2000); Logan, Dempster, Berkeley, Chant, Howell and Warry (1990); Logan, Dempster, Chant and Warry (1990) Bassett (1980).

Source: Australia's Teachers: Australia's Future, Advancing Innovation, Science, Technology and Mathematics. Background Data and Analysis; Department of Education, Science and Training, October 2003. p. 56

A small number of superannuation schemes covering teachers have provisions favourable to early retirement – notably those in Victorian and ACT government schools, which are favourable to resignation at age 54 years 11 months. Although substantial numbers of teachers approaching retirement age can benefit from such

provisions, in the main, these public sector defined benefit schemes have been closed to new members for a decade or more.<sup>44</sup>

### *Strategies for Teacher Retention*

Incentives to attract more talented people to become teachers where shortages are identified need to be considered more thoughtfully. The Australian Government has identified teaching as one of two national higher education priorities, to which it proposes to apply a lower rate of HECS, as a significant initiative. However, those qualifying to teach through completion of a Bachelor of Science degree followed by a graduate teacher education award accrue a higher HECS debt than other teachers, but receive the same pay once employed as teachers. Similarly, those teachers who enrol in higher education units in science, technology and mathematics for the purpose of enhancing their professional expertise accrue a higher HECS debt than their colleagues enrolled in units in other disciplines. The Review Committee concluded that secondary and primary teachers of science, technology and mathematics should not pay more HECS than their teaching colleagues.

There must be better incentives to hold able teachers in the profession. Strategies to retain high quality teachers include:

- effective induction programs and mentoring support for beginning teachers;
- ongoing opportunities for professional learning;
- curriculum and pedagogy which engages students;
- strong school based leadership and team practices;
- sustained improvements to the working conditions of teachers;
- articulated professional standards;
- flexible workplaces and enhanced career pathways.

### *Effective induction programs and mentoring support for beginning teachers*

Many first-year teachers feel isolated when they take up their first posting. A survey of beginning teachers found that support in the first year is of critical importance. The experience of a Western Australian teacher is representative of the experience of many beginning teachers posted to regional and remote areas:

I went straight from high school into Uni, and straight from Uni into teaching. I have moved out of the city and lived in the country for the first time, moved away from my family and my friends, moved to a place I'd never even heard of before, and then on top of that starting this big scary job for the first time. I would have loved just once for someone to say, 'how are you going? Are you OK?' Not just, 'can you find the staff toilets, and can you find the books you need?'<sup>45</sup>

Another teacher from Western Australia cited in the same survey expressed a similar view:

I had the chance to observe a really good science teacher who was just brilliant. The behaviour management was excellent, and everything was just so interesting. I thought to myself, I'd love to be like that, and have the kids

respond to me in the way they did for him. But I know that my classes are nothing like that. It often seems boring. But I don't know how to get to where he was, from where I am now. That's what I want in my feedback.<sup>46</sup>

Teacher employers, education faculties and professional bodies representing teachers will need to collaborate so that all beginning teachers receive well structured induction programs, mentoring and time to reflect on their practice. There are many innovative programs and approaches in teacher education, notably those with close links to schools, including organisation of students' practical experience of schools and classrooms. Linkages can be further strengthened between initial teacher education, induction, mentoring and continued professional learning. Additional funding the Australian Government has proposed for the practicum under the Backing Australia's Future package should be used to improve the workplace learning component of initial teacher education.

### *Professional Standards and Salaries*

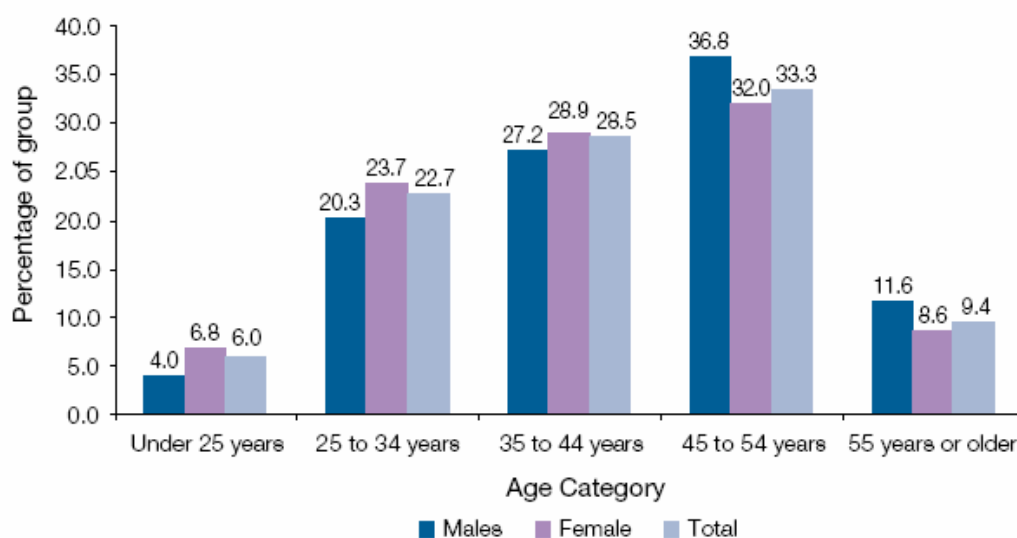
Professional standards will provide a basis of competence for all teachers. When nationally consistent they will also assist in mutual recognition by different jurisdictions and systems of teacher qualifications and capabilities. They will also improve the public profile and standing of the teaching profession. Recognising and rewarding teaching excellence and providing opportunities for teachers to further develop their expertise and leadership within the profession will aid quality improvement. The profession itself should play a leading role in steps to achieve these outcomes.

Consideration should be given to rethinking career progression according to teaching performance. Recognising and refining strategies to support quality teaching and educational leadership will be important. Teacher salary advancement should be based on teaching performance and career structures, with better recognition points for proficient teachers and highly accomplished teachers. Diverse roles teachers perform to complement class teaching, including mentoring, community leadership, cluster support and other leadership roles within the school, need to be recognised. Progressively, teaching career and salary advancement should come to be based on merit and teaching performance rather than length of service, with accomplished teachers rewarded at higher rates. While starting rates for teachers' salaries are comparable with other professions, ceilings reached eight to eleven years after entering the profession and lack of rewards for outstanding quality of teaching disadvantage teachers.<sup>47</sup> Furthermore salary increases over time has not kept pace with similar professional occupations. Over the 15-year period to 2000, the average weekly ordinary full-time earnings for secondary teachers rose by 76 % and those for primary teachers rose by 75 %. By comparison, the average weekly ordinary full-time earnings of full-time adult non-managerial professionals rose over the corresponding period by 86 %.<sup>48</sup>

Progressively, teaching career and salary advancement should come to be based on merit and teaching performance rather than length of service, with accomplished teachers rewarded at higher rates is an important principle – just how teacher employers wish to implement this principle is a matter for them. Budgetary realities for government and other employers mean that addressing some of the issues

surrounding remuneration is considerable. This is not specific to Australia—it is a worldwide phenomenon. Any change to remuneration would need to be sustainable within this context. There are some realities that need to be taken into account that will not see radical changes taking place in the short to medium term. The teaching workforce is one of the largest of all workforces in Australia. In 2002, there were 249, 629 teaching staff employed in all schools, with 68 % of teachers employed in the government sector, and 32 % in the non-government sector.<sup>49</sup> In 1999, close to 80% of teachers were full-time permanent employees, 10% permanent part-time, and 11% on a fixed term contract.<sup>50</sup>

**Figure 15: Percentage of teachers employed by age and gender for 2001**



Source: Australian Bureau of Statistics, Census of Housing and Population (ABS 2001).

Source: Australia's Teachers: Australia's Future, Advancing Innovation, Science, Technology and Mathematics. Background Data and Analysis; Department of Education, Science and Training, October 2003. p. 54

There are other sustained improvements to the working conditions of teachers which the Review Committee recognised other than improved remunerations, such as improvements to:

- physical conditions within schools;
- availability and quality of curriculum resources;
- teaching loads;
- class sizes;
- access to and use of technology;
- appropriate in-service training and the opportunity for study leave and professional development.

#### *Ongoing opportunities for professional learning*

The overall professional preparation of teachers should be strengthened through seeing initial teacher education, practical experience, internships, induction and

ongoing professional learning as a continuum. More extended professional learning is essential for the vitality of the profession. Teachers will be better placed to foster students' innovative capabilities, or respond adequately to students' diverse learning needs if they continue their own professional learning. Professional learning needs to become a central feature of career development—planned, systematic, regular and relevant.

It is necessary to take a wide, career-focused approach to professional learning. Teachers change schools, they move into different areas of specialisation, they may move in and out of the education profession. In addition to professional learning focused on the requirements of the individual teacher's current school, approaches are needed which recognise the changing nature of the teaching career and the directions being taken by education authorities as they develop new priorities and re-position themselves in response to wider jurisdictional and national needs. Upgrading disciplinary and pedagogical knowledge will be at the core of professional learning, especially in the sciences and technology where there are rapid changes in knowledge and techniques. It is a feature of all subject areas that research, scholarship and practical experience are constantly reshaping both the surface features of the domain and its structure and foundations. The message for teacher professional learning is that it be current and vital and that it connects with both teachers' present responsibilities and their evolving career profiles.

Two requirements to meet for a fully functioning system of professional learning for Australia's teachers are:

- recognition and reward for teachers who demonstrate advanced competencies and continued professional development; and
- greatly improved teacher access to and use of new knowledge and the communication and information technologies pertinent to teaching and learning.

#### *Strong school based leadership and team practices*

In order to energise schooling for innovation, a very high quality of educational leadership is required. Competent leaders, who have a strong, clear vision, are determined and have a capacity to inspire and move things forward will be in great demand. They need freedom and authority to steer, manage and orchestrate what are very often large, complex organisations.

Among the key factors in such educational leadership are:

- outstanding leadership, from formally designated staff, notably the school principal, and from the teaching staff and students;
- a clear vision and sense of purpose together with the capability to manage and orchestrate institutional change;
- a commitment by the whole school community, including parents, to this vision and to sustain it in all facets of school life;
- highly competent teachers dedicated to achieving excellent learning outcomes for all students and to maintaining the highest standards of professionalism and professional learning; and

- strong system and employer-led strategic planning, resourcing and support.

These need to be complemented by greater school autonomy in combination with system-wide strategic steering and resourcing, targeted professional learning and flexible career pathways. However, schools are not working individually and in isolation; teams, external partnerships, clusters and networks are connecting teachers and schools with one another and with the wider community. These can be extended and teaching made a more collaborative enterprise.

Science and mathematics education coordinators should be appointed for clusters of secondary schools and their feeder primary schools to stimulate science teaching and learning in primary schools and ensure that the teaching and learning of science and mathematics are well articulated between the two sectors. Primary school science specialists will boost science in primary schools.

### *Curriculum and pedagogy which engages students*

Teachers need a rich understanding of the changing world of children's experience, of youth culture and the lives of students, irrespective of the subjects they teach. Effective teaching requires that teachers are sensitive to and connect with this culture and build upon it. Learning is strongest and most meaningful when it engages students actively, connects with their own knowledge and understanding and relates to their interests and experience. To meet these challenges teachers need a great deal of support in the often difficult conditions of the contemporary school. When schools have been provided with the necessary resources and fully supported, they should be held to account for avoidable weaknesses and shortcomings in student learning. This is a demanding criterion which reflects the fundamental importance of high quality learning for all students.

The potential role of communication and information technology is yet to be fully realised but many schools are well down the track. More flexible working spaces in schools, to enable a wider array of teaching and learning approaches to be used, are being provided through adaptations of older buildings and the design of new ones. But too many schools lack high quality spaces and resources for learning that are needed. Flexible teaching-learning spaces and communication and information technology provide the means for more creative teaching and better learning outcomes. These are particularly needed to overcome such problems as student disengagement in the middle years of schooling and to motivate and support those students whose learning outcomes have been weak or poor. As shown in the international comparisons of student performance in reading, scientific and mathematical literacy, while Australian students perform very well on average and the best students attain high scores, too many do not do well, so there is room for considerable improvement. The foundations have to be laid in high quality early childhood education and care.

The exemplary teaching and learning practices that daily occur in Australia's schools are too often submerged beneath highly publicised problems. An investment in the dissemination of good practice and more systematic recognition of outstanding achievement would benefit all schools and give the community a better understanding of how schools are changing.

## Teachers for the Future

The kinds of change we need to see in Australian schools and teaching are already happening, and these in short are characterised by a greater opening of schools to the world. Across Australia, successful schools are showing the way forward as outward-looking learning centres, forming partnerships within the community and drawing on the resources of technology to facilitate learning. Therefore teachers for the future are here in the present. Fortunately, across Australia we have some exemplary schools which are showing the way forward for encouraging innovation. Their common characteristics are:

1. They are outward looking, open to change and new ideas.
2. They focus on ways of learning, learning how to learn. This means a focus on thinking skills at the expense of memorizing huge slabs of content from textbooks. They focus on “authentic assessment” – assessment methods, not only formal examinations, which genuinely test the skills being sought, and by a variety of means.
3. They get students engaged with science (and with mathematics and technology – and the applications of science) through stimulating their interest with hands-on activities, and the excitement of contemporary science and scientists through forming partnerships and networks with science related organizations and with industry, They get an involvement with today’s real science and scientists outside their school classrooms.
4. The emphasis is on students as innovators, problem solvers, communicators, creative team players, learning to be adaptive, technologically skilled and life long learners.

The challenge is to find ways to spread these practices and successes nationally and to support teachers in the diversity of schools around the nation.

The future success of schools will be built on partnerships, networks and trust. Education organizations must work together to build and invest in people, and partnerships and links through networks and clusters of various kinds. This needs support and resources on a national scale. A regeneration of teaching will lead to a new and more open outlook for schools, other education institutions and within education systems. Local connections will remain, as national and international connections within education, and between education and other linked organizations, evolve in the coming decade.

## END NOTES

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- <sup>1</sup> Australia's Teachers: Australia's Future, Advancing Innovation, Science, Technology and Mathematics. Main Report; Agenda for Action; Background Data and Analysis; Department of Education, Science and Training, October 2003.
- <sup>2</sup> Review of Teaching and Teacher Education, Discussion Paper: *Strategies to Attract and Retain Teachers of Science, Technology and Mathematics*. Department of Education, Science and Training, September 2002; Review of Teaching and Teacher Education, Interim Report: *Attracting and Retaining Teachers of Science, Technology and Mathematics* Department of Education, Science and Training, February 2003; Review of Teaching and Teacher Education, Discussion Paper: *Young People, Schools and Innovation: towards an action plan for the school sector*, Department of Education, Science and Training, March 2003.
- <sup>3</sup> Doorstop Transcript of the Hon Dr Brendan Nelson, 9 October 2003. Media Release, Minister for Education, Science and Training – Dr Brendan Nelson.
- <sup>4</sup> More places and lower fees: Teaching report supports Labor policy, 9 October 2003. Media Release, Jenny Macklin, Deputy Opposition Leader and Shadow Minister for Employment, Education and Training.
- <sup>5</sup> Orietta Guerrera. New teachers bail out early. *The Age*. 10 October 2003, p. 3; Christopher Bantick. Stem the Exodus. *The Courier Mail*. 17 October 2003, p. 21.
- <sup>6</sup> Australia Teachers: Australia's Future – Main Report, p. 87.
- <sup>7</sup> Stacey Lucas. Report warns of teacher shortage. *Canberra Times*. 10 October 2003, p. 5.
- <sup>8</sup> Jim Cumming. Top teachers merit top pay. *The Australian*. 17 October 2003, p. 13; Linda Doherty. Pay teachers on merit: Report. *Sydney Morning Herald*. 10 October 2003, p. 14.
- <sup>9</sup> Australia Teachers: Australia's Future – Main Report, p. xxi.
- <sup>10</sup> Jim Cumming. Top teachers merit top pay. *The Australian*. 17 October 2003, p. 13.
- <sup>11</sup> Stacey Lucas. Report warns of teacher shortage. *Canberra Times*. 10 October 2003, p. 5.
- <sup>12</sup> Ministerial Council on Education, Employment, Training and Youth Affairs, The Adelaide Declaration on National Goals for Schooling in the Twenty-first Century, MCEETYA, Melbourne, 1999.
- <sup>13</sup> Catherine Livingstone. From harmonisation to globalisation. Address to Global Coaching Partnership Annual Conference, 6 May 2003.
- <sup>14</sup> Department of Employment and Workplace Relations; National Skill Shortage List—Australia 2003.
- <sup>15</sup> Professor Alison Elliott, University of Canberra, submission no. 96. Review of Teaching and Teacher Education.
- <sup>16</sup> Isolated Children's Parents' Association of Australia (Inc), submission no. 48. Review of Teaching and Teacher Education.
- <sup>17</sup> James Cook University, School of Education, submission no 207. Review of Teaching and Teacher Education.
- <sup>18</sup> N. Dempster, C. Sim, D. Beere and L. Logan, *Teachers in Australian schools*. A Report from the 1999 National Survey. Executive Summary, Department of Education, Training and Youth Affairs, Canberra, 2000.
- <sup>19</sup> Australian Bureau of Statistics, *Schools Australia 2002*, Catalogue No. 4221.0, ABS, Canberra, 2003. pp. 102–103 (see J Ainley and C Underwood, *Australia's Teachers: Australia's Future*, Vol. 3, Background data and analysis, Review of Teaching and Teacher Education, DEST, Canberra, 2003. pp. 56–57).
- <sup>20</sup> Australian Bureau of Statistics, 2003, op cit. (See Ainley and Underwood, op. cit., section 5, p. 56).
- <sup>21</sup> Ainley and Underwood, op. cit., section 2, pp. 3–4. However more students are now continuing to Year 12. As a result, the proportion of those who commence secondary schooling who go on to study physics and chemistry in Year 12 has grown modestly over the last twenty-five years. Substantial increases in participation in mathematics among Year 12 students have occurred over the last decade, but largely in “fundamental” mathematics, with a modest decline in participation in “advanced” mathematics. Participation in technical and information and communications technology studies rose dramatically over the same period.
- <sup>22</sup> OECD and UNESCO Institute for Statistics, *Literacy Skills for the World of Tomorrow: Further Results from PISA 2000*, 2003; and J Lokan, L Greenwood and J Cresswell, *15-Up and counting, reading, writing, reasoning ... how literate are Australia's students? The PISA 2000 Survey of students' reading, mathematical and scientific literacy skills*, Organisation for Economic Cooperation and Development Programme for International Student Assessment, Australian Council for Educational Research, Melbourne, 2001.

- <sup>23</sup> B. Birrell, I.R. Dobson, V. Rapson and T.F. Smith, *Skilled Labour: Gains and Losses*, Centre for Population and Urban Research, Monash University, 2001.; *Review of Teaching and Teacher Education, Main Report*, p. 72.
- <sup>24</sup> Ministerial Council on Education, Employment, Training and Youth Affairs, *Demand and supply of primary and secondary school teachers in Australia*, MCEETYA, Melbourne, 2001.]
- <sup>25</sup> Ainley and Underwood, op. cit., section 4, pp. 36-38. An increase in the number of domestic completions from initial teacher education courses occurred between 1999 and 2001 – from 9,488 in 1999 to 14,490 in 2001 – with the increase less pronounced in secondary teacher education programs.
- <sup>26</sup> Ainley and Underwood, op. cit., section 4, p. 35.
- <sup>27</sup> Ainley and Underwood, op. cit., section 4, pp. 36, 48; G.A. Lawrance and D. Palmer. *Clever Teachers, Clever Sciences: Preparing Teachers for the Challenge of Teaching Science, Mathematics and Technology in 21<sup>st</sup> Century Australia*. Canberra: Commonwealth Department of Education, Science and Training. 2003.
- <sup>28</sup> University of Melbourne and Queensland University of Technology, correspondence with the Review Committee. *Review of Teaching and Teacher Education – Main Report*, p. 59.
- <sup>29</sup> Organisation for Economic Co-operation and Development. *Education Policy Analysis*. Paris: Centre for Educational Research and Innovation, OECD. 2002.
- <sup>30</sup> Ainley and Underwood, op. cit., section 3, p. 22; In that same period, there has been a marked rise in commencements in information technology.
- <sup>31</sup> MCEETYA, *Demand and Supply*, op. cit.
- <sup>32</sup> Ibid.
- <sup>33</sup> Australian Bureau of Statistics. *Transition from School to Work*. 2001.
- <sup>34</sup> The Hon. Alan Cadby MP, Shadow Minister for Education and Training, Western Australia, Submission no. 51, p. 1. *Review of Teaching and Teacher Education*.
- <sup>35</sup> Colin McFayden, Submission no. 18, p. 1. *Review of Teaching and Teacher Education*.
- <sup>36</sup> New South Wales Department of Education, Submission no. 141, p. 18. *Review of Teaching and Teacher Education*.
- <sup>37</sup> University of Tasmania, Submission no. 84; University of Western Sydney, Submission no. 89, p. 11; Frances Meeking, Submission no. 7, p. 1. *Review of Teaching and Teacher Education*.
- <sup>38</sup> Association of Heads of Independent Schools, Submission no. 58, p. 6; Aboriginal and Torres Strait Islander Commission, Submission no.70, p. 7; Queensland Deans of Education Forum, Submission no. 65, p. 7; Faculty of Education and Creative Arts, Central Queensland University, Submission no. 66, p. 10. *Review of Teaching and Teacher Education*.
- <sup>39</sup> R. Ballantyne, D. Blaine, and B. Preston. *Teacher Education Course and Completions: Initial Teacher Education Courses and 1999, 2000 and 2001 Completions*. Department of Education, Science and Training, forthcoming, p. 65.
- <sup>40</sup> I. Allen, 'The supply of new teachers from Victorian universities', unpublished report for the Victorian Institute of Teachers, 2002, p. 4.
- <sup>41</sup> New South Wales Department of Education, submission no. 141, p. 15. *Review of Teaching and Teacher Education*; In the United States, research has found that 29 % of all beginning teachers leave teaching after three years, increasing to 39 % after five years. Richard Ingersoll. *Turnover Among Mathematics and Science Teachers in the US*. National Commission on Mathematics and Science Teaching for the 21st Century, Washington, 2000, p. 6; See also Eric Hirsch, Julie Koppich and Michael Knapp; *Revisiting what States are doing to Improve the Quality of Teaching: An Update on Patterns and Trends*. Center for the Study of Teaching and Policy, Washington 2001, p. 19.
- 42 MCEETYA; Information statement 15th MCEETYA Meeting, Perth 10 - 11 July 2003. <http://www.curriculum.edu.au/mceetya/meetings/meet15.htm> Around 11,000 to 12,000 teacher education completions annually to 2005 are projected by MCEETYA, of whom 70% to 75% are assumed available for teaching. Taking the mid-point of that range and using three different attrition rates – 25% (which we believe to be at the upper end), 20% and 15% - over the first five years of those new teachers' careers, we can estimate roughly that:
- 25% - around 2,900 beginning teachers will have left the profession within five years; Note that the figure based on a 25% rate of attrition over five years is broadly consistent with figures presented in a submission to Review from the NSW Department of Education which showed that around 525 teachers left NSW government schools in 2001 - within the first 4 years of their teaching careers.
  - 20% - around 2,300 beginning teachers will have left the profession within five years; and
  - 15% - around 1,700 beginning teachers will have left the profession within five years.

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In light of advice that the rate of attrition among beginning teachers in the Victorian government school system are considerably lower than each of the above rates, the best estimate of loss is probably that based on a 20% average national rate of attrition. We therefore estimate that nationwide 2,300 teachers annually leave the profession in the first five years of their careers.

<sup>43</sup> Australian Bureau of Statistics. *Australian Social Trends*. ABS Catalogue 4102.0. 2003, pp. 102-103.

<sup>44</sup> R. Clare. 'Superannuation arrangements for Australian teachers and their impact on retirement decisions', paper commissioned for Review of Teaching and Teacher Education from the Association of Superannuation Funds of Australia Research Centre, 2003, p. 4; In the three financial years 1999-2000 to 2001-02, there were 2,065 teachers in Victoria eligible to claim 54/11 benefits, 72% of whom (1,487) took advantage of that provision. The impact of this incentive will diminish over time. Only a small minority of the 38,000 Victorian public sector teachers are now members of the relevant scheme. In the ACT, about 50% of teachers in the government school system are members of the Commonwealth Superannuation Scheme (CSS), which offers a 54/11 benefit to many teachers. In the year to 30 April 2003, there were 66 resignations out of around 105 CSS members who reached the relevant age – about 63%. Different schemes operating in NSW respectively offer full benefits to qualifying female teachers at age 55, and at age 58 for both men and women.

<sup>45</sup> Tasmanian Educational Leaders Institute, Department of Education Tasmania. *An Ethic of Care: Effective Programmes for Beginning Teachers*. Department of Education, Science and Training, forthcoming.

<sup>46</sup> Ibid.

<sup>47</sup> Data from the 2001 Census of Population and Housing indicate that teachers' average weekly earnings was \$897, compared the average for the workforce of \$799. Salaries in government schools commence at an average of \$40,000 and, at the top end of the classroom teacher scale, salaries range from \$55,000 to \$60,000. Australian Bureau of Statistics. *Census of Population and Housing*. ABS Catalogue 2015.0. 2001.

<sup>48</sup> Ibid.

<sup>49</sup> Australian Bureau of Statistics, *Schools Australia*. op cit; At the primary level, the government sector accounts for almost three-quarters of the teaching staff, 72.7%, while at the secondary level, for 62.9%. Australian Bureau of Statistics. *Education and training in Australia, 2002*. Catalogue No. 4224.0. ABS. 2002).

<sup>50</sup> Australian Bureau of Statistics. *Schools Australia* op cit; In 2002, Australia had 249 629 school teaching staff; 225 353 full time equivalent, representing an increase of 1.4% over 2001. Teaching staff are defined as those staff that spent the majority of their time in contact with students. Australia had 9632 schools in 2002.