

# **EDUCATION, INNOVATION AND AUSTRALIA'S ECONOMIC FUTURE**

Address to the

**Australian College of Educators  
2008 National Conference**

**Hotel Grand Chancellor  
Hobart, Tasmania**

14 April 2008

*by*

Saul Eslake

Chief Economist  
Australia & New Zealand Banking Group Ltd

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\* My colleague Mark Rodrigues made a very substantial contribution to this address. However the responsibility for any views expressed herein is entirely mine. In particular, the views expressed herein are not necessarily those of my employer or any of its other officers.

Thank you for the invitation to be with you this morning. That's not solely because it gives me the an opportunity, albeit sadly only a brief one, to spend a little time in Tasmania. It's also because the role of educators in an economy is as critical as any other essential infrastructure, and the College's mandate to advance your interests and promote ongoing development in the profession is indeed a worthy one.

When I was first approached to address the topic, 'Education, innovation and Australia's economic future', it seemed pretty straight-forward to me. Economists have long recognised the connections between the capabilities of a nation's people – what we often refer to as 'human capital' – and its economic performance.

But as with most things in economics, the relationship is much more complex in practice than in theory. Thus, for example, while we know that human capital accumulation is a fundamental building block of economic growth, in practice it is difficult to quantify accurately its impact on the economy, because it embodies an element of 'quality' that cannot be directly measured. Separating out the contribution of human capital from that of other sources of economic growth (such as population growth and investment in physical capital) has proved equally challenging.

It is appropriate, therefore, that the level and nature of investment in education has moved to a more prominent position in public discussions, particularly in the lead-up to and since last November's election, during which the Australian Labor Party campaigned heavily on the promise of an 'education revolution'. Issues around the funding of public education institutions, technology infrastructure in the nation's schools, and teacher performance and remuneration, are now at the very centre of the national public policy debate. And regardless of your views on these issues, it seems to me to be a huge leap in the right direction that we're having conversations about them.

The renewed focus on education in this country comes, in my view, not a moment too soon, as we draw ever closer to an inevitable demographic transition as the Baby Boomer generation moves into retirement. The most recent official estimates suggest that population ageing will reduce growth in real GDP per person by around ½ of one percentage point over the next forty years relative to the past forty years<sup>1</sup>. These trends, which are largely irreversible, underscore the importance of lifting both productivity and labour force participation if we are to continue to achieve the kind of growth in living standards over the next few decades to which we have become accustomed.

For most economists, education represents an important plank in the platform to address Australia's medium term economic challenges.

### **Why education matters: an economist's perspective**

As my introductory remarks suggested, economists represent a somewhat sympathetic audience when it comes to the cause of educators. Most theories of economic growth include a role for the accumulation of human capital, whether through formal education and training, on-the-job experience, or in other ways. And this role has been made more explicit (and central) in the 'new' or 'endogenous' growth models that have dominated macroeconomic thinking since the late 1980s.

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<sup>1</sup> Australian Government 2007, *Intergenerational Report*, Canberra.

For economists, there are two primary means by which an increase in educational attainment affects economic outcomes<sup>2</sup>. The first is via increasing the skills and abilities of *individual workers*. More formally, this is known as 'human capital deepening'. The intuition here is clear: individuals who obtain more education and training, *on average*, are more 'productive' (in the sense of producing a greater quantity of goods and services per hour worked), have stronger employment prospects and obtain higher wages, than those with less education.

There is significant evidence to support this proposition. For example, thus far during the present decade, growth in employment for high-skilled occupations has averaged 3.6% per annum, accounting for 62% of all employment growth over this period<sup>3</sup>. By comparison, employment of tradespeople, clerical workers and labourers has grown by averages of 1.8%, 1.5% and 0.4%, respectively, over the same period.

Not surprisingly then, the probability of being unemployed is inversely related to an individual's level of educational attainment. As at May 2007, the unemployment rate for individuals with a university degree was 2.1%. This compares with rates of 4.9% for those whose highest educational attainment is Year 12 and 7.6% for those that did not complete high school<sup>4</sup>.

Even in employment, labour market fortunes continue to lag for less-educated workers. In 2005, full-time employees with a bachelor degree earned *at least* 47% more than those who had only completed high school, who in turn earned around 6% more than those that didn't complete high school<sup>5</sup>.

Numerous academic studies have more formally documented the relationship between educational attainment and earnings. Professor Steve Dowrick from the Australian National University reports that studies in developed economies typically conclude that each additional year of schooling raises lifetime earnings by between 5 and 10%<sup>6</sup>. Hence, a one-year increase in the length of schooling across the entire working age population would add somewhere between one-eighth and one-quarter of a percentage point to annual GDP growth over the forty years that such a change would take to filter through the working age structure of the economy<sup>7</sup>.

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<sup>2</sup> Most of the discussion that follows is couched in terms of the *quantity* of education. From a policy perspective, increases in educational attainment may also be achieved by increasing the *quality* of a given level of education. Studies have documented a significant positive correlation between proxies for quality such as test scores (especially for maths and science) and economic growth. See, for example, Barro, R 2003, *Education and Economic Growth*, OECD, available at [www.oecd.org/dataoecd/5/49/1825455.pdf](http://www.oecd.org/dataoecd/5/49/1825455.pdf); and Hanushek, E 2002, *The Long Run Importance of School Quality*, Education Next; available at [www.educationnext.org/200023/10.html](http://www.educationnext.org/200023/10.html).

<sup>3</sup> 'High-skilled' occupations are defined to include Managers and Administrators, Professionals and Associate Professionals. See Australian Bureau of Statistics 2008, *Labour Force, Australia, Detailed, Quarterly, February 2008* (Cat. No. 6291.0.55003).

<sup>4</sup> Australian Bureau of Statistics 2007, *Education and Work, May 2007* (Cat. No. 6227.0).

<sup>5</sup> Wage premiums were even more significant for those with post-graduate qualifications. See ABS 2005, *Education and Training Experience, Australia, 2005* (Cat. No. 6278.0).

<sup>6</sup> Dowrick, S 2002, *The Contribution of Innovation and Education to Economic Growth*, Paper presented to the Melbourne Institute Economic and Social Outlook Conference *Towards Opportunity and Prosperity*, April 4-5 2002, available at [www1.ecom.unimelb.edu.au/iaesrwww/conf/top2002/pdffiles/DowrickSteve5A.pdf](http://www1.ecom.unimelb.edu.au/iaesrwww/conf/top2002/pdffiles/DowrickSteve5A.pdf)

<sup>7</sup> Note that this channel has only a *level* effect on income in the long run with any short-run *growth* effects expiring after the change in average levels of educational attainment has permeated through the entire working age structure of the economy (assumed here to take forty years).

The second means by which economists perceive a link between educational attainment and economic performance has come to prominence in the past two decades with the development of 'new' or 'endogenous' growth theories. It focuses on the creation and implementation of *new ideas* as a key driver of productivity growth. These theories are based on the premise that ideas – unlike the other factors of production; land, labour and capital – are 'non-rival' in nature. That is, once they are in the public domain, ideas can be simultaneously replicated by multiple users and potentially developed further for other applications. This is a particularly powerful concept because it means that the value of ideas reflects the maximum potential applications (or technological advances) that it spurs, which is theoretically unlimited.

The development of the internet exemplifies this proposition. The ideas underpinning its initial development in the US Defense Department in the 1960s and 70s have been disseminated, replicated and developed on such a scale that it is now one of the most popular modes of communication in the world today. Its initial developers could not possibly have envisaged that their ideas would one day be used to conduct banking, book travel, make phone calls, work from home, watch videos and listen to music, send emails, share personal information on networking sites or access information on almost anything you could possibly conceive<sup>8</sup>.

The natural conclusion of this line of thinking is that if ideas and technological advances are the engine of economic growth, then education and other investments in human capital should also promote long-run growth by facilitating the generation of new ideas - as well as enhancing the capacity to absorb, implement and develop existing technologies. In his survey of the literature, the ANU's Steve Dowrick reports that each additional year of schooling boosts long-run economic growth by between 0.2 and 0.8 percentage points per annum.<sup>9</sup>

Note that this estimate is *in addition* to the level effect contributed by human capital deepening. Even adopting the more conservative estimates, the total boost to economic growth of one additional year of schooling is around 0.325 percentage points per annum.

Education may also play an important role in lifting labour market participation, which, as I mentioned earlier, is a key strategy to combat the economic effects of population ageing. There is a clear positive association between educational attainment and labour force participation. Recent research from the Commonwealth Treasury shows that among all age groups, those who have completed schooling to year 12 have higher labour force participation rates than those who have not<sup>10</sup>. This is perhaps not that surprising given higher incomes associated with more education also increases the 'opportunity cost' of not engaging in paid employment<sup>11</sup>. Hence, a further increase in retention rates to year 12 could be expected to have a positive effect on overall labour force participation and hence on economic growth.

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<sup>8</sup> I am almost certain that this is not nearly an exhaustive list of the things for which the internet is used today, let alone will be used for in years to come.

<sup>9</sup> Dowrick, *op. cit.*, p. 8.

<sup>10</sup> Kennedy, S and D Hedley 2003, *Educational Attainment and Labour Force Participation in Australia*, in Commonwealth Treasury, *Economic Roundup*, Winter 2003, Canberra.

<sup>11</sup> At a macroeconomic level, this same effect is evident in declining rates of fertility over the past four decades as educational attainment and access to paid employment for women increased and pay differentials with men narrowed, thereby increasing the implicit cost of withdrawing from the labour market to raise children.

The same research also found a clear association between age, educational attainment and labour force participation. In particular, male workers with upper-secondary or post-secondary education are much less likely to drop out of the work force once they turn 55 than those who have failed to complete year 12. This suggests that efforts to improve access to 'life-long learning', and to formal education at older ages, could play an important role in ameliorating the adverse economic consequences of population ageing.

### **Tasmania's educational outcomes and economic performance: a case study**

Tasmania provides a highly relevant 'case study' for the propositions I've been making about the linkages between levels of educational attainment and economic performance.

As most of you will be aware, Tasmania is Australia's poorest State. Despite a considerable improvement in its growth rate over the past decade, compared with the preceding one, Tasmania's per capita gross State product and per capita household disposable incomes are nearly 15% below the national average, and in each case the lowest of any State or Territory. Although Tasmania's unemployment rate has fallen significantly over the past decade, it remains the highest of any State or Territory, and is more than one percentage point above the national average. Moreover, there is a much greater incidence of 'hidden unemployment' in Tasmania than in any other State or Territory; when this is taken into account, the proportion of working-age Tasmanians who are in employment is almost 5 percentage points below the mainland average. And for those Tasmanians who do have jobs, average earnings are about 9% below the national average.

There are many explanations for these (and other) unflattering comparisons, and traditionally many of them have emphasized Tasmania's relatively small population and isolation from large population centres on the mainland. Yet such factors should not inevitably condemn an island with a small population on the periphery of a large continent to poor economic and social outcomes: otherwise Ireland and Iceland could not now have the third and fourth highest per capita incomes in Europe.

Rather, as I have sought to outline on other occasions<sup>12</sup>, an important contributor to Tasmania's consistently poor economic outcomes is the relatively low productivity of the Tasmanian workforce (some 7% below the national average); and that this in turn is in no small part due to the relatively low educational attainments of Tasmanian students and adults.

The proportion of working-age Tasmanians with any sort of post-school qualifications is, at 47% in 2006, the lowest of any State and some 5 percentage points below the national average. The proportion of working-age Tasmanians with a bachelor's degree or higher is, at 16%, about 4½ percentage points below the national average.

Conversely the proportion of working-age Tasmanians who have not completed school up to year 12 is, at 44%, the highest of any State or Territory and exceeds the national average by more than 10 percentage points.

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<sup>12</sup> See, for example, *Productivity, Prosperity and Living Standards* (Launceston, February 2007) or *Poverty in Tasmania: An Economist's Perspective* (Hobart, October 2005), both available at <http://www.anz.com/aus/corporate/EcoComm/StateFocus.asp>.

It may well be that such comparisons are exacerbated by the tendency of those Tasmanians who do acquire tertiary qualifications to pursue more highly-paid positions on the mainland or beyond. However the problem begins at an early stage than that. The retention rate of Year 10 students through to Year 12 in Tasmania is only 65%, more than 10 percentage points below the national average; and much of the progress which had been made between the mid-1990s and the early years of this decade in narrowing that gap has subsequently been reversed.

Moreover, not only do Tasmanians incontrovertibly receive a smaller *quantity* of education, on average, than other Australians; there is also some evidence to suggest that the *quality* of education which they receive is in at least some respects inferior to that provided in other parts of Australia. For example the results of the most recent OECD Programme for International Student Assessment as part of a global study of 15-year olds in 57 countries shows Tasmanian students ranking behind every other part of Australia except the Northern Territory on reading literacy, mathematical literacy and scientific literacy<sup>13</sup>.

Essentially the same conclusion emerges from other assessments such as those published by the Ministerial Council on Education, Employment, Training and Youth Affairs and ACER's Trends in International Mathematics and Science Study<sup>14</sup>. Disturbingly, these two studies suggest that although Tasmanian children perform as well as their counterparts in the mainland states in Year 3, the longer they remain in the education system the further they fall behind.

The consequences of the below-average quantity and quality of education received by Tasmanians show up in other ways. A survey of adult literacy and life skills published by the Australian Bureau of Statistics last year<sup>15</sup> shows that the proportion of adults having the lowest level of proficiency in prose and document literacy, numeracy and problem-solving ability was higher in Tasmania than in any other State (typically 3-4 percentage points above the national average), while the proportion of adults having the highest level of proficiency in these areas was lower in Tasmania than anywhere else except the Northern Territory (and typically 2-3 percentage points below the national average).

A second illustration, and one which derives its importance from the second of the two channels linking education to economic performance in the theoretical literature which I referred to earlier, comes from another ABS survey<sup>16</sup> which shows that the proportion of Tasmanian businesses innovating (that is, introducing new or improved products, or new ways of producing existing products or managing existing processes), and the proportion of Tasmanian businesses' sales revenue derived from new or significantly improved products, is lower than that of businesses in any other State.

I should emphasize that I am not attributing blame for any of these poor outcomes to Tasmanian teachers.

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<sup>13</sup> Australian Council for Educational Research (December 2007), *PISA 2006 National Report*, Fact Sheet 5, [http://www.acer.edu.au/news/2007\\_PISA.html](http://www.acer.edu.au/news/2007_PISA.html).

<sup>14</sup> Ministerial Council on Education, Employment, Training and Youth Affairs, *National Report on Schooling 2006*, <http://cms.curriculum.edu.au/anr2006/index.htm>; and Australian Council for Educational Research, *Trends in International Mathematics and Science Study 2002-03*, [www.acer.edu.au/research/TIMSS/TIMMS\\_02\\_03.htm](http://www.acer.edu.au/research/TIMSS/TIMMS_02_03.htm).

<sup>15</sup> Australian Bureau of Statistics, *Adult Literacy & Life Skills Survey, Summary Results 2006* (catalogue no. 4228.0).

<sup>16</sup> Australian Bureau of Statistics, *Innovation in Australian Business 2005* (catalogue no. 8158.0).

Rather, I think they are the result of long-entrenched beliefs on the part of Tasmanians regarding the value of education, beliefs which have been reflected in the structure of the Tasmanian education system.

If there is any grounds for optimism in this area at all, it is that the current Minister for Education, David Bartlett, has clearly recognized Tasmania's long-standing underperformance in this area and has been willing to advocate and implement reforms aimed at correcting it – although with the best will in the world it will take a considerable time for these reforms to achieve their aims.

### **Making the most of limited resources**

Let me return to the national scene. Given the economic growth-enhancing virtues of investments in human capital, and the ample scope to lift the quantity and quality of education in this country, the elevation of the issue to the top of the policy agenda under the new Federal Government is indeed welcome. The Rudd Government has set itself an ambitious agenda. Consider the following announcements in this field in just the first four months of government:

- provision of 15 hours a week and 40 weeks a year of preschool education delivered by an early childhood-qualified teacher;
- access to computers for each upper secondary school student and high-speed broadband connections for all schools;
- a target of achieving a 90% year 12 (or equivalent vocational training) completion rate;
- 450,000 new vocational education and training places;
- reduced fees and extra training places in critical disciplines facing severe skill shortages;
- extending the socioeconomic status funding system to public schools;
- an increase in the number of Australian Postgraduate Awards, and;
- a Review of Australian Higher Education, due to report by the end of this year.

These initiatives will come at a significant cost. To some extent, this was always going to be required. Between 1995 and 2004, public funding of educational institutions slid from 78.9% of all funding to 73%, and now sits well below the average contribution in OECD countries of 87%<sup>17</sup>.

But more money in and of itself is not a panacea for raising education outcomes. In launching the latest report from the OECD's Programme for International Student Assessment (PISA), Secretary General Angel Gurría noted that, "across the OECD area, student performance has generally remained flat between 2000 and 2006 while expenditure on education in OECD countries has risen by 39% in real terms during this period"<sup>18</sup>.

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<sup>17</sup> This decline was most marked for tertiary education, where the public contribution slid from 64.8% to 47.2% between 1995 and 2004. See OECD 2007, *Education at a Glance 2007*, OECD, Paris.

<sup>18</sup> Gurría, A 2007, *Launch of PISA 2006*, Speech by Angel Gurría, OECD Secretary-General, Tokyo, 4 December.

In other words, money is a necessary but not sufficient condition to raising educational attainment. Clearly, where the money is directed and how efficiently it is spent matters at least as much as the amount of money available.

I could not possibly canvas here all of the issues that will need to be addressed if the government's 'Education Revolution' is to make a material difference to the stock of human capital in this country.

Rather, in time I have left, I want to focus on an issue that will almost certainly form the base of the policy response: early childhood education and development.

The reason I say this is that there is now a mountain of evidence documenting the correlation between earlier school performances and later school performances<sup>19</sup>.

For example, US research shows that the distribution of mathematics achievement tends to increase between Years 2 and 7, with those in the upper end of the distribution in early years continuing to make steady progress while those in the lower end progress much more slowly<sup>20</sup>. In a similar vein, Australian research has found that by Year 5, the top 10% of students in reading are at least 5 years ahead of the bottom 10%.<sup>21</sup>.

These results – which are, frankly, scary – confirm two things: first, there is significant variation in the development and 'school readiness' of students by the time they commence formal education; and second, this initial capacity gap perpetuates and widens over the course of a student's school life. Combined, these two facts suggest that the most effective interventions are those that address preparedness of children to engage in formal education *before* they commence their studies in the first place.

In this regard I am encouraged by the inclusion of early childhood development, and the specific objective of increasing the proportion of children with basic skills for life and learning, in the human capital stream of the Council of Australian Government's National Reform Agenda.

Current research efforts are hampered by the relatively sparse evidence on the effects on early education, but based on a survey of the literature, the Productivity Commission concludes that broad-based education programs could improve the high school completion rate of children with low basic skills by as much as 18%<sup>22</sup>.

Early childhood education is but one area that we need to lift our investment in to substantially raise educational outcomes in this country. But I would suggest, given the evidence I've presented today, that the return on such investments is one that would satisfy even the most savvy investors.

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<sup>19</sup> An accessible summary of the literature is available in the Business Council of Australia's policy paper, *Restoring our Edge in Education: Making Australia's Education System its Next Competitive Advantage*, available at <http://www.bca.com.au/Content/101189.aspx>.

<sup>20</sup> Hauser, C 2003, *So, what d'ya expect? Pursuing individual growth targets to improve accountability systems*, Paper presented at the annual meeting of the American Educational Research Association, Chicago.

<sup>21</sup> Masters, G and M Forster 1997, *Mapping Literacy Achievement: Results of the 1996 National School English Literacy Survey*, Canberra: Department of Education, Training and Youth Affairs.

<sup>22</sup> Productivity Commission 2007, *Potential Benefits of the National Reform Agenda*, Report to the Council of Australian Governments, Canberra.

**Conclusion**

Education is important in its own right, as well as for the social benefits it confers on individuals and on the broader community. The fact that higher levels of educational attainment, widely dispersed across the community, also generate significant economic benefits for individuals and the broader society is not, and shouldn't be seen as, the primary justification for an enhanced focus on education in public discourse. But it is part of the argument, and I've been grateful for the opportunity to articulate it here with you today.