The “good enough” education system. Does Australia have the education system it needs for a vibrant economic future?

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Abstract

Concerns are expressed almost daily that while Australia has managed to survive the world economic crisis and is in the midst of a resources-driven boom, the country is facing a major challenge in the decline of its productivity growth.

Conventional wisdom tells us that for productivity growth to occur, a nation needs innovation, and a key enabler of that innovation is a strong education system.

However there is little discussion about what exactly constitutes such a system and how we can measure the impact of changes in this system in terms of national economic indicators.

This lecture will explore these issues with particular reference to anomalies and mixed incentives in the current Australian higher education system and to education systems around the world.

1. Introduction

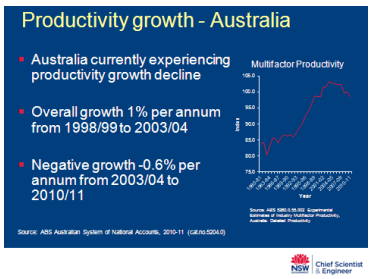
It is a great honour to be here to deliver the Harold Wyndham memorial lecture tonight. I thank the NSW Institute for Educational Research, and the Australian Catholic University, for asking me to present.

There have been many inspiring orators who have stood in this place before me including Barry McGaw, the Hon Linda Burney MP, Peter Doherty, Robin Batterham….

Sir Harold Wyndham, of the famous 1957 Wyndham Report, was notable for his education reforms including removing selection for and extending the years for secondary schooling, and incorporating social and creative components into schooling for a more rounded education. It is fitting that he is honoured by this major public lecture.

Such self-expansion and diversification within education are themes I will touch on tonight. But first I'd like to lay out a problem.

Productivity
Despite our current mining boom, Australia is currently facing a major challenge in the overall decline of its productivity growth after experiencing a strong growth cycle in 1998-99 to 2003-04 (1 % average annual improvement in multi-factor productivity).and good productivity growth over quite a period. [ABS, 2011]



Back then, more than a decade ago now, Australia was in the midst of experiencing some major social and economic policy reform largely instigated in the preceding decade by the then Commonwealth Government.

This was important reform including financial deregulation - the floating of the dollar, microeconomic and industrial relations reform through the union accord, a strengthening of national competition policy, and in education and research, the 'Dawkins Reforms' of the late 80s.

The 1990s saw massive productivity growth and an upsurge of new ICT products, and services and capabilities due to the rise of internet.

At this time Australia's productivity growth was above OECD average for the first time. The 1990s saw the highest underlying productivity growth and the longest period of continuous productivity growth on record (9 years).

The possibilities were limitless. Or so it seemed.

In 2011 we find ourselves standing in a very different light to that of the 1980s and 1990s reform era. From about 2003 Australia began to decline in productivity to almost zero and is now going backwards.

In the most recent productivity growth cycle (2003-04 to 2007-08) there was an overall decline in Australia's productivity. Output growth during this cycle averaged 3.6% per year, while total inputs grew at an average 3.8% per year (labour at 2.4%, capital at 5.4%). The -0.2% difference between input growth and output growth was the average annual decline in productivity. [ABS, 2011]

But average incomes have continued to increase throughout the last decade. In essence Australians are earning more for doing the same.

This structural decline is of great national concern. Much has been written - and continues to be written - on the subject with many commentators offering various 'fixes'. But the matter is complex.

All discussions on achieving productivity growth acknowledge a nation needs strong innovation – both incremental and breakthrough.

The Productivity Commission states: "National productivity growth stems from a complex interaction of factors…some of the most important immediate factors include technological change, organisational change, industry restructuring and resource allocation, as well as economies of scale and scope. Over time, other factors such as research and development and innovative effort, the development of human capital through education, and incentives from stronger competition promote the search for productivity improvements and the ability to achieve them" [Productivity Commission, 2009].

Trying to understand just how bad the problem is is a matter that the Productivity Commission keeps examining. In a report released by the Commission just last month, Dean Parham [2012] argues that a large part of the productivity slump can be attributed to adjustment pressures reflecting an economy in transition, an economy which has seen a build-up of inputs (high company profits and business investments) principally from the mining sector and related industries, without the corresponding outputs.

2. Innovation necessary for productivity growth

When examining more closely the phenomenon of what drives productivity growth – which is expressed as a single numerical indicator – one can find some answers by exploring the components of a healthy innovation system.

In 2008 I was on the panel charges with the Review of the National Innovation System which produced the report 'Venturous Australia – Building Strength in Innovation'. Around the same time the United Kingdom produced its own innovation review: 'Innovation Nation'.

Both reports drew similar conclusions and identified the same necessary conditions for innovation: a good education system, a good R&D system, strong business innovation, the need for innovation in the public sector and community, fiscal and market facing innovation programs, and innovative people and skills. Similar reviews around the world emphasised these things.

Early on in the 2008 Innovation Review, I suggested to my colleagues on the panel that we all write on a scrap of paper what we each thought was the one most important factor influencing innovation. Each member of the panel wrote down 'education'. It was seen by all as the one most important necessary condition of innovation – but not, of course, sufficient.

But how much intervention in our education system is needed? What aspects of education should we address?

3. The 'good enough' mother

Some of you may be familiar with the British paediatrician Winnicott's concept of the "good enough mother" which he introduced in 1953. He pointed out that for children to develop successfully they need to have the experience of "**a mother [who] is neither good nor bad nor the product of illusion, but is a separate and independent entity: The good-enough mother ... starts off with an almost complete adaptation to her infant's needs, and as time proceeds she adapts less and less completely, gradually, according to the infant's growing ability to deal with her failure"** [Winnicott, 1953]

The good-enough mother is not neglectful but she provides a container in which the child develops by learning by doing and through failure.

It is important to note that Winnicott asserted that a good enough mother was better for a child than a perfect mother.

So when it comes to influencing productivity growth, do we have a "good enough education system"?

We know education is an important lever to stimulate innovation – but how much does it contribute to productivity growth and how can we measure aspects of it to know that they are linked to economic indicators? How much of it should we let go and leave to its own devices? And how much are we, perhaps unwittingly, inhibiting productivity growth in the way we educate our people?

4. Innovation Indices – data & detail

A useful way of exploring innovation is through various international innovation indices. These indices gauge a country's innovation capacity through a weighted range of indicators, such as education, R&D, infrastructure, business environment, known to be relevant to innovation. The indicators are pulled together to create a ranked index of countries.

There are several major indices that look at the innovative capacity of countries.

Two were released in 2009. One of these is the Global Innovation Index developed by the Boston Consulting Group and the National Association of Manufacturers. [The findings were published in a report in 2009 the 'Innovation Imperative in Manufacturing: How the United States can restore its edge']. The index, like many such indices, was based on two major components of innovation – inputs – such as government fiscal policy, education policy, and the innovation environment – and

outputs – such as patents, technology transfer, R&D results, business performance and broader public impact of innovation.

Australia ranked 22nd on the index, behind Singapore 1st, Switzerland 3rd, USA 8th and Germany 19th [BCG, 2009].

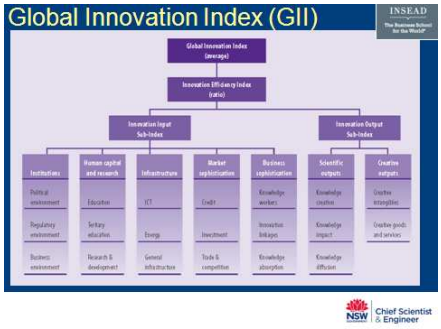
In 2009 the Economist Intelligence Unit also released an update of its innovation index 2007 which measures innovation output by the number of patents granted to people from different countries by the patent offices of the US, the European Union and Japan. The index also looks at input factors that it calls "innovation enablers" such as the amount of research and development (R&D) and the technical skills of the workforce. Australia ranks 20th on that index, with Japan and Switzerland ranked 1 and 2 [EIU, 2009].

But tonight I'd like to concentrate on two other major, extremely well-constructed indices that have the advantage that they have been produced annually – for at least the last 5 years and which are up-to-date to 2012. They provide us with detailed information about where Australia ranks globally in terms of its capacity for, and outputs of, innovation.

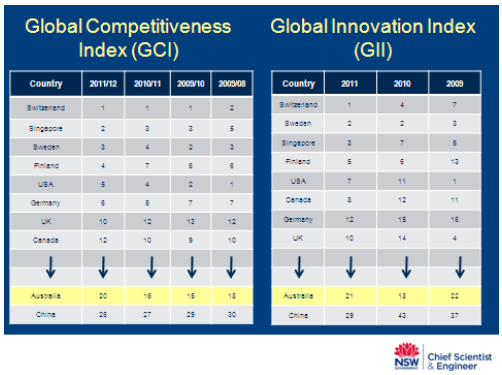
They are the World Economic Forum's Global Competitiveness Index [WEF, 2011] and the INSEAD Global Innovation Index [INSEAD, 2011]. INSEAD is an international graduate business school and research institution originally French and headquartered there with campuses in Asia and the Middle East as well, and a research centre in Israel.

The Global Competitiveness Index [GCI] uses indicators based on both survey and hard data, whereas the Global Innovation Index [GII] uses mostly hard data and a small amount of survey data where hard data cannot be found.

The Global Competitiveness Index defines competitiveness as the set of institutions, policies and factors that determine the level of productivity in a country. The Index is calculated through a weighted average of 113 different components, each measuring different aspect of competitiveness. These components are grouped into 12 pillars – as can be seen in this slide – they are: Institutions, Infrastructure, Macroeconomic environment, Health and primary education, Higher education and training, Goods market efficiency, Labour marker efficiency, Technological readiness, Market size, Business sophistication and Innovation.



The Global Innovation Index [with 80 components] is based on two sub-indices – the innovation input sub-index and innovation output sub-index – each of which is built around pillars – as can be seen in this slide. Five input pillars capture elements of the national economy that enable innovative activities: Institutions, Human Capital and research – which includes education indicators-, Infrastructure, Market sophistication and Business sophistication. Two output pillars capture actual evidence of innovation outputs: Scientific Outputs and Creative Outputs.



Australia is currently ranked 20th in the world – down from 15th in 2008/09 and 5th in 2001/02 – on the Global Competitiveness Index, and 21st on the Global Innovation Index. Australia seems firmly stuck around 20th place.

It is interesting to see the countries that consistently appear in the in the top performing groups over the last few years. Switzerland is currently ranked 1st on both of the indices and has consistently ranked highly on the indices as well as the USA, Finland, Sweden, Singapore, the UK, Canada and Germany, countries we would think of as 'natural' competitors. Other countries that we lag behind on both indices are Hong Kong, Denmark and Norway.

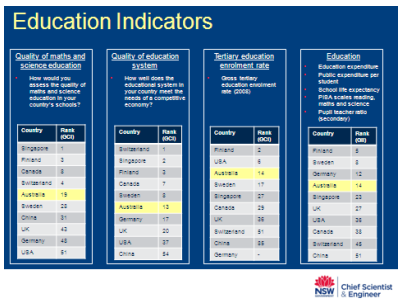
While China currently ranks lower than Australia on the indices, the country is showing a steady improvement in the rankings over time.

So we might ask ourselves - What makes these nations 'more innovative' than Australia? – How do they consistently rank higher, or are able to improve their rankings?

If we take a closer look at the indices, looking at the individual indicators, we may gain clues into the areas in which Australia 'needs improvement' or should be looking to build upon to develop a move innovative nation.

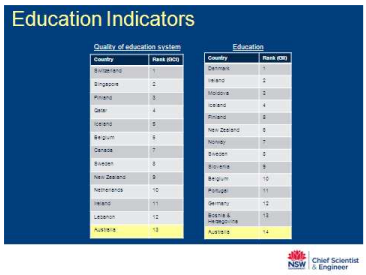
Australia's most notable advantages is its efficient financial system – ranked 6th (GCI) – supported by a banking sector that counts among the most stable and sound in the world – ranked 4th (GCI).

Let's take a look at the education indicators. Overall Australia ranks reasonably highly on both indices in terms of education indicators and often ranks higher than some of the overall top performing countries.



For example if we look at survey questions in the Global Competitiveness Index, Australia ranks 13th for the quality of the education system for a competitive economy, with the UK ranked 20th and the USA 37th. In terms of quality of maths and science education Australia ranked 19th, ahead of Sweden 28th, the UK 43rd and USA 51st. And the quality of primary education, Australia was ranked 10th, with Sweden 18th, UK 23rd, Germany 36th and USA 37th.

Australia ranked, 20th, on the percentage of enrolments in tertiary education, but is ahead of Sweden at 25th, Switzerland 34th and the USA 46th.



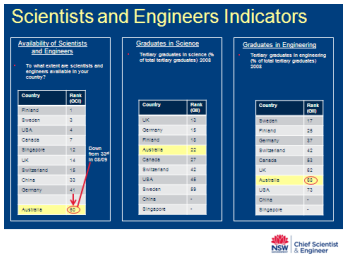
In the indicators for education in the Global Innovation Index, Australia ranked 14th for education, which was based upon measures of expenditure per student, reading and maths scores and attendance rates, well ahead of Canada 38th and Switzerland 45th.

The perceptions – from the survey data – and the numbers are telling the same story. When it comes to education Australia is seemingly performing well.

According to these indices we seem to have a 'good enough' education system.

But where are we going wrong in the innovation indices?

Where is it that we are letting the side down?



One field within the basket of education indicators is the availability of scientists and engineers. Through survey perception ["to what extent are scientists and engineers available in your country"] and numbers of graduates, this is an area in which Australia is ranked poorly.

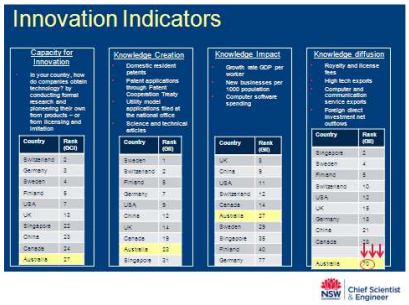
In the Global Competitiveness Index, Australia ranked 60th for the availability of scientists and engineers – a survey question – which was down significantly from 33rd in 2008/09. In the same time period China has risen from 52nd to 33rd. Australia is ranked behind Finland 1st, Sweden 3rd, USA 4th and the UK 14th.

And whilst we are ranked 22nd on the Global Innovation Index for percentage of tertiary Science graduates, we are ranked a disappointing 68th for the percentage of tertiary Engineering graduates.

While in the area of Engineering graduates a lot of developed nations are being beaten in the rankings by countries in the developing world and Asia - with Iran ranked 1st, Malaysia 2nd, South Korea 3rd, and Vietnam 8th - we are still solidly behind the OECD economies such as Sweden, Finland, the UK and Germany.

Turning to knowledge production and diffusion, Australia ranks highly in terms of scientific outputs in terms of publications – ranked 7th on the world on the Global Innovation Index – but when you put this in combination with other outputs such as patents, licence fees and high tech exports – we are being dragged down in the rankings.

We are good at research, but are we good at turning ideas into products and services? Innovation is more than the R&D that you do, but what you do with the R&D.



In the Global Competitiveness Index Australia is ranked 27th in the world for our capacity for innovation – defined as how companies obtain technology through research and development of their own products or from licensing and imitation. Similarly, in the same index we are also ranked 27th for company spending on R&D – well behind the key player such as Switzerland 3rd, and the USA 4th.

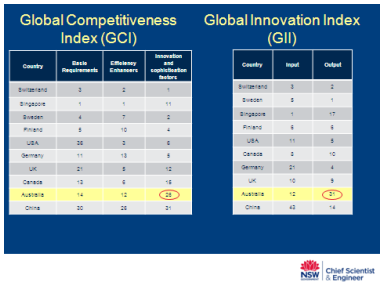
On the Global Innovation Index Australia ranks 33rd in Scientific Outputs which is based on the three sub-indexes, Knowledge Creation, Knowledge Impact and Knowledge Diffusion.

In Knowledge Creation – that is the number of patents and scientific and technical articles - Australia is ranked 23rd.

In Knowledge Impact – Growth rate of GDP, New business creation and computer software spending – Australia is ranked 27th, above Finland, France and Germany.

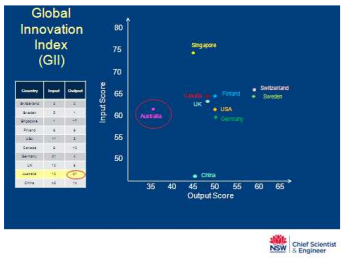
Where Australia dives in the rankings is in Knowledge Diffusion – Licence fees, high tech exports, and computer and communication service exports – ranked at 70th place, well behind other countries that rank highly on the overall index – such as Sweden, Finland and the USA.

When we compare inputs to outputs for innovation, we can clearly see that outputs are where Australia needs work.



In the Global Competitiveness Index, Australia ranks highly for inputs – 14th for Basic Requirements and 12th for Efficiency Enhancers - whereas we rank 26th for Innovation and sophistication factors.

In the Global Innovation Index, the output sub index is clearly dragging down the overall index ranking - with Australia ranking 12th for inputs, and 31st for outputs.



This can be clearly seen in this graph of innovation inputs scores vs outputs. Australia stands clearly apart from the major 'innovative' countries such as Switzerland, Sweden and Germany. Australia has a similar score as these nations in terms of inputs, but it is the outputs that sets us apart – and this is where improvements need to be made if we want to catch up to these nations. The graph also shows China standing apart. With the current growth of China it will be interesting to see how quickly it joins the big players in the innovation rankings.

When the Global Innovation Index calculates the Innovation Efficiency – the ratio of Inputs to outputs, Australia ranks 97, behind Sweden 6th, Switzerland 12th and the USA 26th.

These indices and their subcomponents tell us that excellent performance in innovation inputs is not translating into productivity growth and sustainable increasing wealth, despite the fact that we are not bad at R&D and do comparatively well in education alongside the rest of the world.

Indeed as I highlighted, our rankings on education sub-indices are decent. But it could be that we have a good enough education system structurally but need to think about aspects of its content.

5. Fixes - how can the education system play a bigger role?
I believe there are some things we can do to enable our education system to play a bigger role in stimulating innovation and lifting productivity growth.

Engineering
One of the clear gaps as outlined by the indices is the problem we have in producing enough engineers. For a country which continues to experience mining booms and will do so into the future due to our rich mineral resources, we have found ourselves in a situation where we do not have enough engineers to fill job vacancies.

A key reason for this is the drop in students doing maths and science in high school, particularly at advanced levels. This impacts the number of people studying engineering, maths and physics at university. At the same time, there are not enough maths and science teachers, particularly quality teachers who have tertiary qualifications in maths and science.

This is not just an academic issue. It has serious implications for Australia's bottom line and, indeed, our productivity problem.

Now I have said this on numerous occasions - with the study of maths particularly in decline at school, we need to find other ways of catching kids on their way to university and encouraging them to study maths-intensive areas like engineering and the physical sciences. Engineering is an ideal candidate for reconsidering its approach to maths. Engineering faculties could be, at a minimum, trialling alternative curricula that allow students with maths aptitude but with no formal maths subjects at HSC, to enter engineering degrees and finish in minimal time.

As I noted in a piece in The Australian [O'Kane, 2010], we can learn from our own success in supplying computer science graduates. As I said, "until at least the dotcom bust, we had years of shortages of computer science graduates to fill employer demand globally. However, in that field we were lucky that, thanks to the Association for Computing Machinery (working more recently with the Institute of Electrical and Electronics Engineers), we had regularly updated, excellent global curriculums that recognised that not all students arriving at university had the maths confidence or content to manage the highly mathematical nature of the discipline, especially with regard to discrete structures and logic.

These computer science curriculums presumed no serious background knowledge in maths but included well-managed, well-articulated and entertaining exercises that had a positive effect on student motivation. Through time you could see students' fear of the subject lift and within two to three semesters students had reached the high levels of maths necessary for program verification and theoretical computer science. These were incredibly successful programs that recognised that lack of previous study of maths shouldn't necessarily be a barrier to further study where students are motivated, committed and interested.

Despite these programs having been around for decades, by and large they have not been adopted within other university faculties.

Engineering, in particular, which has identified shortages of professionals, is an ideal candidate for reconsidering its approaches to maths."

Doing this would also go a long way to addressing the shortage of women undertaking engineering degrees. The latest figures here are stark. In the last decade, female students comprised on average 16% of all students graduating from university-level engineering courses in Australia [see DEEWR datacube]. Thus women continue to be significantly under-represented in the engineering industry.

The key, I believe, is motivation and disabling the psychological fear of maths. Maths subjects which are well crafted, entertaining and properly managed can have a positive effect on student motivation, self-worth and subsequently performance.

Another inhibitor is cost. Following the Bradley Review any expansion of higher education places is at fixed funding from governments, a price well below the actual cost of an engineering place. Any expansion in engineering education will need to be funded specifically.

A third issue is image. Engineers are seen as nerds. Enough said.

Teaching as a high-status profession

Even though I have highlighted Australia's relatively high ranking in the innovation indices in education, it is interesting to see which countries persistently beat us. Some of these countries, most notably counties like Finland, have a strong record of culturally valuing teaching as a profession and according it high social status. In Finland it is difficult to gain entry to education degree courses.

A well educated population needs superb teachers and if we are to attract the best the rewards – status, remuneration – need to be high.

As I've pointed out several times, education is seen a necessary condition for innovation and therefore productivity growth. It is a central part of the knowledge industry and knowledge is an increasingly valuable commodity today. The economist Nicholas Gruen describes education as "the business of replication". It makes sense to put the best people in education where you're going to have the greatest influence. For every clever and committed teacher there are 30-odd kids soaking up the lessons. This results in a dynamic contribution to growth. The quality of teaching matters – performance of teachers influences performance of students.

Innovation education

The tougher aspect turns around the core of where Australia slips on the innovation indices. We are good at teaching and generating knowledge but not good at translating knowledge into wealth, turning it into skills, products, and services.

What can we do about it?

Well we could look at the things we do poorly and address specific issues. For example, we have addressed a great deal in terms of the perennial university/industry collaboration issue – an issue we have poured a great deal of effort into and been rewarded with better scores. On the GCI we were ranked 19th in the world in 2008/09, and we are now ranked 14th. And on the GII we were ranked 21st in 2009 and rising up to 12th in 2011.

We could be explicit about better patenting practices, although international patenting is expensive and not to be undertaken lightly. But with moves to open innovation it's not as clear that patenting is going to be as core to translating knowledge into wealth as it was. Indeed some open innovation mechanisms suggest otherwise.

For those unfamiliar with the concept, open innovation often takes the form of an innovation competition where a specific problem is advertised widely along with a reward for solving it. There are many examples of innovation competitions, many of which are through philanthropic foundations or major companies that are trying new ways to solve very hard problems or bring new ideas to their industry.

Some examples include the X prizes, run by a non-profit organisation that designs and manages public competitions intended to encourage technological development that could benefit mankind. You may have heard about the Archon Genomics X prize where the target is to sequence 100 human genomes, of people over 100, at a maximum cost of $1,000 per genome.

Some competitions in development aim to develop bionic limbs, simple cancer blood tests, bring back extinct animals, predict earthquakes and clean up space junk.

Because the world is changing (e.g. open innovation in certain cases superseding patenting), simple addressing of individual sub-indices in innovation indices is useful but can be far too simplistic a response to what is clearly a more long-term problem for this country.

I think we need to look deeper within our systems and culture at some of the underlying issues affecting our innovation performance. Knowing the reasons why is something that has been elusive for some time. Even before the productivity growth problem became so stark, we knew there was an issue here, with, for example, lack of commercialisation skills.

It's worth noting that not only are our outputs lagging well behind our inputs, but also there is a general perception among industry that Australia has a problem.

"The GE Innovation Barometer [GE Australia, 2012] found that while 86 per cent of Australian business leaders agree innovation is the main lever to create a more competitive economy, only 2 per cent of the 2800 global executives surveyed nominated Australia as an "innovation champion". Asked to assess their own country's reputation, 18 per cent of the 100 Australian executives in the survey put us in the "champion" category." [Gibson, 2012].

Australians are a competitive bunch that's for sure. You just need to note our collective obsession with sport to recognise this. But, curiously we are not risk takers. It is here where our seemingly adequate education does not progress to confident, ideas-driven and innovative workplaces, and business models which are internationally recognised and valued.

In an education sense we need to take on the notion of innovation education. President Obama has, and is, promoting the idea that we have to educate to innovate.

Like Obama, I don't think this is just at the MBA level but at all levels of our education system. If we are about what is in many ways cultural change, it is more likely to be useful early in schooling where kids can learn the skills of entrepreneurs. It's also where we begin to understand who has aptitude and can package knowledge and turn it into good business. There is evidence that children with a talent for innovation can be identified and encouraged [Shavinina, 2011].

But this is an area that is not well understood or researched. Post the 2008 innovation review I spoke about generic skills for innovation but I was inferring them from knowledge of what makes some great entrepreneurs tick. The skills I suggested we need were:

- Creativity
- Not afraid of change
- Resilience in the face of change
- Appetite for risk
- Tolerance of failure & fast failure
- Persistence (seems in tension with tolerance of failure)
- Re-framing issues
- Communication/marketing/selling new idea
- Absorptive capacity for new things & ability to spot opportunity of melding old & new; not afraid of the new; willing to dredge back through the old
- A critical sense
- Symbolic reasoning & maths
- Collaboration

Recent research by Shavinina (2011) at the University of Quebec suggests I was close to the money. She discusses a rare group of students who are able to both generate ideas and implement them into practice, turning them into products, processes or services. These young innovators are not necessarily 'gifted' students so far as the traditional definition goes, but possess an entrepreneurial giftedness and a set of qualities which make them predisposed to innovative thinking and activities.

According to Shavinina, "the following interrelated yet different *specific* manifestations of entrepreneurial giftedness were identified:

- Constantly generate ideas on how to make money.
- Love to generate and implement real-life projects with at least a minimal financial reward.
- Love doing real business plans with predicted financial outcomes.
- Work passionately and hard on executing their plans.

- Wish to do ‘real’ things that bring money and try to do whatever possible to cut unnecessary steps.

The *general* manifestations of entrepreneurial giftedness include the following interrelated characteristics.:

- perseverance to succeed,
- optimism and ‘change the world’ attitude,
- early exposure to challenges,
- competitiveness, excellence and perfection,
- neglect of academic subjects – many are not good at school
- independence in thoughts and actions and a rule-breaking attitude
- creative abilities of great entrepreneurs (developing their own creative methods)
- ability to implement ideas
- having a unique point of view
- practical intuition”

Other skills she identified in related work include:

- courage
- practical wisdom
- deadline management

Many of these qualities can be acquired through practicing appropriate generic skills (perhaps not the characteristic of neglect of academic subjects!). These skills include critical thinking, how to communicate, knowledge acquisition but also knowledge application, how to specify problems and significantly how to appreciate failure.

Take wanting students to develop perseverance. In March this year, Professor Steven Schwarz, Vice-Chancellor of Macquarie University, wrote in the Times Higher Education Supplement that “teachers are used to parental demands for deadline extensions, re-marking of exams and various forms of special consideration. It’s understandable parents want their children to succeed. Unfortunately they may be ensuring the opposite. By preventing their children from experiencing failure, they also stop them gaining the self-confidence that comes from overcoming it. If we want young people to be able to handle life’s inevitable slings and arrows, then for their own sake we must let them fail” [Schwarz, 2012].

It is this ethos which propels innovative thinkers to take risks and seize opportunities without the paralysing fear that failure equals doom, but rather with the view that it is an essential part of the innovation journey. Remember Thomas Edison allegedly said “I failed my way to success.”

Similarly we could call on the recent flood of research on learned optimism to develop that characteristic.

And so on.

The flow-on benefits are enormous. If we do not foster an innovative mindset within our young people and through a dynamic and supportive education framework we will continue to see a fall in our world standing for innovation and competitiveness. By fixing the problem of tomorrow and building the companies, leaders, products of our economic future, this means working out what the skills, capabilities, attitudes are that we need to teach today.

But in developing innovation education, we must be innovative and risk-taking in our approach. As I have emphasised there is relatively little research done but we can't wait until we know all about this field. One of the points the innovation reviews stressed is the need for public sector and community innovation – we certainly need innovation here.

Governments need to think about piloting experimental innovation education programs and maybe selective schools – perhaps a different version in each state – and monitoring the impacts on motivation, performance, confidence levels of students.

Also we need to encourage people – children and adults – to take responsibility and be innovative in acquiring the skills they lack in order to become more innovative.

As with the concept of the good-enough mother, we need to ensure no child is neglected by the education system but we also need to ensure our education system provides all the necessary tools, flexibility and support for students to enable them to think for themselves and accept failure as a part of the process. The student needs to understand that he/she is the protagonist, the agent of progress. In this regard we also need to consider where we might be unwittingly inhibiting the self-confidence and growth of our young people via too-rigid parts of our education system.

6. Conclusion: Do we have the good enough education system?

In summary, Australia probably does have an education system that is good enough structurally although one important part of ensuring the health of that structure - attracting our most talented to be teachers - needs attention.

But with regard to content, our education system needs attention to be fit for purpose. We need to educate more engineers if we are to get truly get maximum prosperity through our mining boom.

Even more importantly, if we are to stand any chance of reversing our productivity growth problem, we need to have a much more innovative culture. To get that we will have to modify our education system.

We need to foster education frameworks which emphasise to students - of all ages - the availability of options open to them at each stage of their learning careers. We need to help cultivate within young innovators the capacity to search for what is significant to each of them as potential agents of change.

Maybe it is time for a new Wyndham report which embraces the spirit of the 1957 edition and recommends new subjects to study around innovation education. A report alone will not be enough of course.

Constant examination and revision of how we operate as a country is needed. And a flexible, dynamic and encouraging education system is needed. It doesn't need to be perfect but it does need to be good enough.

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