



Australian Government

Chief Scientist

ATSE Clunies Ross Awards

20-minute keynote speech

“The future’s unfolding pattern”

21 May 2014

6.00 pm

Perth Convention Centre Ballroom 1

1. Sir Ian Clunies Ross: Mediocre Scientist, Science Giant

In the Records of the Australian Academy of Science there is a lengthy memoir of Sir Ian Clunies Ross, the giant of Australian science.¹

It begins like this:

Ian Clunies Ross had no major scientific advances to his credit.

It continues:

Ian seems to have come to science not out of intellectual curiosity, or even out of fascination with the possibilities of applied research, but because he liked animals.

...He regarded himself as an indifferent scholar.

...He enjoyed hurling pieces of carcass around the dissecting room with his students.

...He made no secret of his lack in certain skills such as mathematics.

In sum, the writer notes: *He was not a great scientist.*

The writer of this piece was Sir Ian's son.

So of course we put this bloke on the fifty dollar note, and honour him with some of most prestigious national science awards.

¹ Anthony Ian Clunies Ross, 'Ian Clunies Ross 1899 – 1959' *Records of the Australian Academy of Science*, vol 3, no. 3/4, Canberra, 1977.

2. Scientists achieve great things beyond the lab.

Anyone whose memory stretches back to the 1950s will not find this the least bit curious.

At the helm of the CSIRO, Clunies Ross made possible some truly great feats in science.

But more than this, he understood the great things that science could offer to Australia.

He looked at problems with a scientist's eye, and he solved them with a scientist's skills.

The nation we know today owes much to that strength of vision.

As one of his students said:

From a sketchy contemporary outline, he saw the unfolding future pattern.²

3. The role for science is now an open question.

Sir Ian's example is instructive, especially at a time when the need for science education is increasingly open to question.

I am thinking of those who believe we have a glut of science graduates. In particular, there are some who accuse me of contributing to this surplus population.³ I can only dream of being so powerful. I found it hard enough to influence my own children, let alone all of yours.

So I want to defend myself against this charge of irresponsible enthusiasm tonight.

4. I have three problems with the 'science glut' theory.

² Ian McDonald, cited in (1).

³ Andrew Norton, 'A bubble about to burst: why we don't need more maths and science graduates', *The Conversation*, June 21 2013.

A) It dismisses the broad value of a science degree.

Clunies Ross took his degree in Veterinary Science – second-class honours.

He spent much of his career working in management, human relations, and public policy.

Would he regard his degree as a waste of time? I suspect not.

- It made him a strategist and a logical thinker.
- It taught him that a person's mind is far more important than their colour, race or creed.
- It opened his horizons beyond the status quo.

We can all be very grateful that he ignored his father's dying advice not to be a scientist, and enrolled in the Agriculture Faculty at the University of Sydney.

Glut theorists tell us that opportunities for science graduates are narrow, and they point to outcomes in graduate surveys in specific fields to make their point. The Life Sciences category is a particular favourite as they talk about 'science'.

Now I can accept that a person who chooses one of the many professionally-oriented degrees in this field would expect to enter that profession.

You train as a physiotherapist, to be a physiotherapist.

The same could be said of forensic science, sports psychology or exercise physiology.

But it is disingenuous – to say to the least – to make the leap from those applied science degrees to imply an experience for all science graduates.

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- This year my office commissioned Deloitte to survey over one thousand firms, across all sectors on their workforce needs. More than four in five firms agree that people with STEM qualifications are valuable to the workplace, even when their qualification (that is, the discipline of their major field of study) is not a prerequisite for the role.
- More than 70 per cent say their STEM qualified staff are among their most innovative.⁴

So I would not lament the fact that science-trained students work in fields other than their major discipline.

Indeed, it would seem to be a particular Australian view to suggest that this is somehow a failing.

Somebody with quantitative skills, and understanding of evidence - how to analyse it, argue it, test it, check it, advance it and use it - might well be useful, even if their physics is not what they use. Didn't Clunies-Ross fit the mould?

I would encourage more employers right across the economy to see the value of a science-based education and thus a scientist's skills which go beyond the particular discipline they studied.

B) It flies the face of what we know about industry needs.

We can never guarantee that any graduate will walk out of university into a job. We should not be telling young people that science graduates, those with what we should think of as a 'generalist' science degree not one aimed at a specific professional niche, find it hard to get employment because of a survey taken a few months after graduation.

⁴ Deloitte Access Economics, *Australia's STEM workforce – a survey of employers* (upcoming).

- Last year the Australian Industry Group warned “Our relative decline of STEM skills is holding back our national economy and causing real frustration for employers.”⁵
- Australian businesses sponsored 11,360 457-visas in professional, scientific and technical jobs between 2008 and 2012.⁶

These trends prompted the ABS to look at patterns for STEM-trained workers in the economy.⁷

- 2.1 million workers had a STEM qualification in 2010-11. People with these qualifications were no more or less likely to be employed than people with non-STEM qualifications.
- But their prospects for future employment were much brighter. Jobs commonly held by people with STEM credentials had grown at 1.5 times the rate of non-STEM jobs.
- That aligns to international research, which suggests that 75% of the fastest growing occupations require STEM skills and knowledge.⁸

And even if there were a mismatch between supply and demand today, and of course I mean today:

⁵ Australian Industry Group, *Lifting our Science, Technology, Engineering and Maths (STEM) Skills* (2013).

⁶ Department of Immigration & Citizenship, Subclass 457 Statistics

⁷ ABS, *Perspectives on education and training: Australians with qualifications in science, technology, engineering and mathematics (STEM), 2010-11* (cat. no. 4250.0.55.005) (released 24 Feb 2014)

⁸ *Lifting our Science, Technology, Engineering and Maths (STEM) skills*, Australian Industry Group, 2013.

http://www.aigroup.com.au/portal/binary/com.epicentric.contentmanagement.servlet.ContentDeliveryServlet/LIVE_CONTENT/Publications/Reports/2013/Ai_Group_Skills_Survey_2012-STEM_FINAL_PRINTED.pdf

C) Why would you use the structure of the workforce now as your guide to the needs of future?

I find it to be very curious that some people seem to expect students at the end of year 10 to be able to work out their study options for years 11 and 12, in preparation for further study, which sets them on the right path for the workforce some six or seven years later.

Economists and those who think like them talk about 'market pull'. Which market is your year 10 student responding to?

And I respectfully suggest that economists don't know either, they just think that they do, a conclusion I reach after many mornings listening to their speculation on breakfast radio.

Putting that to one side, isn't the issue that we have to change our economy? Shouldn't we be shaping the economy to support what we want the country to be, our vision of our future, rather than letting economics tell us what we can and cannot do; what is or is not cost effective rather than what is important

And if we want an economy that can make things, invent things, innovate goods and services that people want and are prepared to buy, then why would we be different from most other developed economies: the jobs of the future are largely, not exclusively but largely, STEM linked.

This is why Germany, the EU, the UK, the US, China, Singapore, Japan, Taiwan, Russia, Brazil are all placing emphasis on STEM skills at school, university and trade levels.

Indeed, the Council of Learned Academies reported an 'almost universal governmental preoccupation with the level of STEM participation' across the 24 countries they surveyed last year.⁹

⁹ Australian Council of Learned Academies, *STEM: Country Comparisons Final Report* (http://www.acola.org.au/PDF/SAF02Consultants/SAF02_STEM_%20FINAL.pdf)

Why would we be different, and leave young people to wander down pathways that are six – plus years long, based on their understanding of what we they might do now if they were completing their course today?

We cannot compel, but we can and should encourage.

I cannot do better than quote from Professor Roy Green's (Head of the Business School at UTS) article last week.

This is the rub. Without world competitive knowledge intensive industries, including advanced and specialised manufacturing, which can capture value from global markets, we face the prospect of our very own "Argentina moment".

This is when a first world lifestyle, dependent on the import of high value consumer goods, can no longer be supported by a third world economic structure, based on the export of unprocessed raw materials. Surely we cannot allow it to come to that.

5. Science graduates are vital to Australia's future

Of course there are many parts to this challenge.

But as a scientist amongst scientists, I want to reiterate the absolute centrality of the work that you do.

I want to urge you to be ambassadors.

We must:

- Invest in people who will produce great science in our universities and research agencies.
- Invest in people who will apply that knowledge in industry.
- Invest in people who can adapt as technologies change.

- Invest in people who think critically, creatively and expansively.

People, in other words, like Ian Clunies Ross – who see the unfolding pattern and shape it to better ends.