

**Submission to the House of Representatives Industry, Science and Innovation
Committee Inquiry into Research Training in Australia**

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Summary of recommendations:

1. *Increase the number of places available under the Research Training Scheme*
2. *Extend duration of all Commonwealth-funded HDR scholarships (eg APA) by 6 months, including those funded through ARC, NHMRC and all other national funding agencies or programs*
3. *Increase value of APA by 30%, and ensure this is replicated in other Commonwealth-funded schemes*
4. *Include generic capabilities in research training, including 150 hours of development over each PhD student's period of candidacy*
5. *Revise the Research Training Scheme guidelines to reflect this requirement*
6. *Provide a targeted supplement to the Research Training Scheme funding dedicated to this additional support for PhD students and the related supervision development (to be paid to universities following approval of their generic capabilities implementation plan)*
7. *Incentivise institutional collaboration in generic capabilities delivery, eg. Regional approaches, online etc.*
8. *Incentivise industry involvement through a national PhD placement scheme*
9. *Establish a pool of funding for universities to access to provide longer term career opportunities for research staff*
10. *Commonwealth funding to facilitate the further development of the QUT ECARD program and replication of the program across the sector*

1. The contribution of research training programs to Australia's competitiveness in the areas of science, research and innovation

The concept of Research Trainee is usually regarded as including Masters by Research, and Doctoral students, but often extends to include Postdoctoral Fellows. Research Trainees make a substantial direct contribution during their training period through the conduct of original research and through generation of a significant proportion of total national outputs including publications, patents, and process innovations across all industry sectors. In addition, as the 'next generation' of researchers, these high performing individuals are the future of Australian science, research and innovation; as well as being the primary source of Australia's higher education workforce.

University-based research training programs are thus the primary component in the development of a sustainable national skills base for research and innovation leadership (including higher education teaching and management) in the global knowledge economy.

Workforce issues relating to Research Assistants, a proportion of whom are concurrently research candidates in doctoral or masters degrees, as well as issues relating to undergraduate research training including Honours courses, require further specific attention; however the primary focus in this submission is on enrolled postgraduate research trainees and PostDocs.

2. The effectiveness of current Commonwealth research training schemes

The bedrock scheme is the Research Training Scheme (RTS). This provides for the supervision and other support for postgraduate researchers. The capping of Commonwealth-funded research training places available through the scheme over a number of years limits its potential to underpin Australia's future global competitiveness in the competition for talent.

An **expansion of funding under the RTS is called for**. It should be tied to efficiency and effectiveness gains (for example, as indicated in the following section related to generic capabilities development).

On the positive side, the funding drivers in the Research Training Scheme introduced within universities a heightened concern for efficiency and accountability, both in terms of national return on investment and the student experience. This has been an important correction to previous practices and it is vitally important to **retain an emphasis on completions in the funding formula**.

The RTS, in supporting research training provision at most Australian universities, improves access for qualified candidates. The involvement of all universities in research training effectively supports a variety of **non-traditional pathways** into research training. The validity of these pathways (alongside the traditional Honours route) and the mode of **part-time candidature alongside continuing workforce participation** must be supported by Government to secure a sufficient flow of capable individuals into research training.

Alongside the RTS, and dependent on it for provision of the basic research training infrastructure, many other Commonwealth research funding schemes are part of the ecology of research training. These include scholarship provision through the APA and IPRS programs, ARC, NHMRC, CSIRO and other PFRAs, CRC program, RIRDCs etc etc. The diversity of these sources, with their varied approaches to research training objectives, is important. Government action to address shortfalls in the RTS and the APA scholarships, as outlined below, should be carried over into all of these schemes.

Improved collaboration between universities, the range of funding agencies, and industry and community partners, is vital in ensuring a research training system that is dynamic, flexible, future-focussed and responsive to national and more localised priorities.

An increase in the number of APA scholarships has been announced by Government and this is an important element in reaching more appropriate levels of uptake of research training. However, two other APA factors require serious attention.

The **value of the APA** and like scholarships is uncompetitive in the marketplace for talent, and it is inadequate to support the kind of fulltime commitment to research required of trainees. Extensive part-time work to keep body and soul together is not conducive to quality outcomes and timely completion.

Furthermore it can be argued that the **extension provisions** under the existing APA scheme have been severely compromised over the past ten years with the Commonwealth effectively now funding a tiny minority of short-term extensions. This bears no relationship to the very real exigencies of research, which even with the best project management, can be subject to unexpected delays. A continuation of this approach risks a systemic debilitating reduction in the level of scientific ambition of PhD projects.

The opportunity to undertake **research work offshore during candidature** provides a significant enhancement of the research training experience and the quality of outcomes. Currently, individual universities make provision to support such activities. A positive Government response to the matters raised above will establish the conditions in which much strengthened outward mobility of research students can be achieved.

Recommendations:

1. *Increase the number of places available under the Research Training Scheme*
2. *Extend duration of all Commonwealth-funded HDR scholarships (eg APA) by 6 months, including those funded through ARC, NHMRC and all other national funding agencies or programs*

3. *Increase value of APA by 30%, and ensure this is replicated in other Commonwealth-funded schemes*

3. The adequacy of current research training schemes to support Australia's anticipated future requirements for tertiary-qualified professionals in a wide range of disciplines

The dynamics of industry development and demand for innovation talent, and the potentially conflicting future academic workforce demands, argue the need for a significant expansion of the number of places available under the RTS, the opening up of opportunities for international research trainees, as well as a range of changes in the conceptualisation of the traditional PhD. The supply of academics will be a global problem given the commonality of mass higher education system development in the “West” and the drive for expansion in the developing nations.

As it is, a large proportion of PhD and other HDR graduates do not go into academe – innovation policy suggests that this is no bad thing, but once the wave of academic retirements peaks, there will be real supply issues for universities, exacerbated by the limitations on capacity to pay competitive salaries against the wider market and global competition – the steady drip of underindexation will make this worse.

A number of new disciplines have been added to the research training spectrum since the introduction of the unified national system in Higher Education. Areas such as Nursing and the Creative Industries – un-represented in the traditional research training environment of older style universities – are recognised for their contribution to the national triple bottom line. The current settings of the RTS have been a significant factor in diversifying doctoral education into these new disciplines.

The RTS should continue to support diversification of doctoral education into emerging disciplines to support requirements for innovation and leadership in new fields in both academia and industry.

A related issue is that research education is being asked to **ensure that PhD graduates have the spectrum of capabilities considered vital to the knowledge economy**. The view that PhDs on graduation should bring the breadth of capabilities necessary to be active contributors to innovation is widely accepted, by both the private and public sectors. This matter is equally relevant for the formation of the future academic workforce given the changing nature of Higher Education institutions.

In this regard, Australian PhD graduates identify gaps in their preparation. In a recent Australian study of PhD graduates from the Go8 Universities five to seven years after graduation, graduates are reported as noting the mismatch between the skills and capacities developed during their traditional PhD and those that were actually required in their later employment. A major cluster of the skills they identified as missing out on lie in the area of generic capabilities: for instance, communication, team work, and project management. (Western, M., Kubler, M., Western, J., Clague, D., Boreham, P., Laffan, W., Lawson, A. (2007) throughout the report, but particularly pps 55-57 www.uqsrc.uq.edu.au/images/HEIP.pdf)

With this in mind, we observe that reconceptualisations of the PhD in Europe and North America to account for employability in the knowledge economy suggest the need for significant variations to the traditional Australian PhD with its singular focus on in-depth knowledge of a specific topic located in a discipline base. While there are differences among the global reconceptualisations, they are characterized by

- Expanding the model of the PhD to focus on multiple capabilities
- Expanding of the traditional research skills associated with the PhD period to include the generics, those skills related to the productivity of graduates' future career and to labour market requirements for innovation.

The introduction of the Commercialisation Training Scheme has been a useful contribution to this agenda, and it should be retained; however it reaches a small minority of the total research training cohort, and a more comprehensive approach is required.

Recommendations :

4. *Mandatory inclusion of generic capabilities in research training, including 150 hours of development over each PhD student's period of candidacy*
5. *Revision of the Research Training Scheme guidelines to reflect this requirement*
6. *Provision of a targeted supplement to the Research Training Scheme funding dedicated to this additional support for PhD students and the related supervision development (to be paid to universities following approval of their generic capabilities implementation plan)*
7. *Incentivise institutional collaboration in generic capabilities delivery, eg. Regional approaches, online etc.*
8. *Incentivise industry involvement through a national PhD placement scheme*

4. Adequacy of training and support (including income support) available to research graduates in Australia

The Postdoctoral experience needs to provide bridges into longterm career development in four key areas: research, academia including teaching, industry and the community more generally.

Postdoctoral Fellowship schemes rarely provide adequate formal attention to these pathways. While preparation for these outcomes during the PhD years can be improved (as above), a **national PostDoc scheme which systematically prepares PostDocs (during their Fellowship) for management and leadership across research, academia, and industry** would yield great national benefits; and would potentially make Australian PostDoc positions more attractive internationally.

5. Factors for graduates that determine pursuit of a career in research

The concept of a research 'career' receives little formal attention during the PhD. QUT is one of very few Australian universities to have a dedicated (Science PhD –qualified) Postgraduate Careers Counsellor.

Limited opportunities at entry point in universities and PFRAs (related to national under-investment in research) discourage pursuit of a career. Short-term/project-based funding for research, which characterises employment of PostDocs and other Early Career Researchers can limit risk-taking in research and impedes career planning.

Traditional patterns of employment in private sector R&D are changing. Open innovation systems mean that more R&D is being outsourced to SME's. Large industry R&D labs have shrunk and/or closed. Research graduates need to be better prepared for this reality.

Industry uptake of PhD graduates needs to be increased through employer tax incentives.

The PhD as a 'training through research' as well as a 'training in research' is not well understood in industry more broadly. This means that industry-based employers underestimate the contribution PhD graduates can make to innovation and the bottom line. An analysis of more than 40 UK studies evaluating stakeholder feedback on research training presents an alarming picture of the misconceptions held by wide sections of industry about the capabilities of PhD graduates. (The Rugby Team, *Evaluating the impact of developing researcher skills. Employers' views of researchers' skills. September 2007. A Comprehensive review of the existing literature into employers' views of the skills of early career researchers.* Downloadable at the following address:

[http://www.grad.ac.uk/downloads/documents/Reports/2007%20publications/Employers'%20views%20of%20researchers'%20skills%20\(pdf\).pdf](http://www.grad.ac.uk/downloads/documents/Reports/2007%20publications/Employers'%20views%20of%20researchers'%20skills%20(pdf).pdf))

6. Opportunities for career advancement for research graduates and staff

The range of opportunities for career advancement includes:

a) Continuing specialisation in research b) Move towards research management, or teaching and research, or teaching c) Apply research training in other industry settings d) Portfolio-style combination of the above.

All of these have potential national and personal benefits. However, career advancement for specialist research staff is limited by the relatively short term and unpredictable nature of employment. At QUT less than 1% of research staff have ongoing employment and the average term of employment is 2 years versus 7 years for Teaching and Research staff. Also, the turnover rate for research staff is 15% versus 5% for Teaching and Research staff. This short term nature of employment is a reflection of the conditions attached to research funding.

Even though QUT has in recent years revised Academic Promotion arrangements and superannuation eligibility requirements to facilitate increased numbers of research staff promotions and improved remuneration benefits, turnover rates have not improved.

Recommendation:

9. Establish a pool of funding for universities to access to provide longer term career opportunities for research staff.

7. Factors determining pursuit of research opportunities overseas

International connectedness and benchmarking is a critical factor for the majority (though not all) of Australia's research endeavours. In principle then, an outward orientation on the part of young researchers is not a negative; as long as the net flows of talent (both Australian, Australian-trained, and international) are in balance from a national perspective measured over time. Openness to, and active encouragement of, these talent flows should then be a characteristic of Government policy.

The most important driver for research graduates in terms of a research career will be the pursuit of excellence – the opportunity to participate in leading edge, high impact research with excellent colleagues and resources to underpin research facilities. Where the opportunities for this are limited in Australia, the impulse to seek opportunities overseas will arguably be stronger. In order for the potentially negative side-effects of this to be minimised, the overall quality of Australian research, research training and the broader innovation system need to be enhanced; but global perceptions of quality need also to be proactively addressed.

On the other hand much of the best research is networked internationally and so opportunities exist for a research career based in Australia to be connected with world's best practice wherever it occurs, as long as Australia's connectivity (meaning IT-based and other linkages) is strong. This proposition argues for close attention by Government and other players to globally linked infrastructure, travel support, support for research collaborations etc and for relevant schemes to privilege Early Career Researcher participation.

8. Australia's ability to compete internationally for high quality researchers

Given the shortfall in Australia's per capita PhD numbers compared to other advanced economies, QUT supports the notion of a single pool of funding for HDR student scholarships open to both domestic and international students -that is conducive to attracting the best talent globally to Australian universities.

A relaxation of visa rules is also required if we are to be seen as an attractive migration destination for highly skilled researchers and other highly educated individuals from overseas. Current requirements of the points-system -especially to do with which areas are priority areas can be cumbersome resulting in Australia being seen as unattractive and prohibitive to prospective immigrants. Given Australia's considerable investment in the training of international students, it is desirable to develop a visa system that encourages graduates to stay and work in Australia, or return in the future.

Managing the impact of a talent flow to Australia from high population source countries in the developing world, particularly South East Asia, requires consideration. A genuine Australian commitment to research and higher education capacity building in such countries is vital for longterm relationships. A **Government-sponsored research volunteers abroad scheme for Early Career Researchers** would have dual benefits

9. Whether Australia's academic workforce is ageing, and the impact this may have on Australia's research capacity

Teaching+Research academics contribute significantly to Australia's research capacity. To meet the future salary costs of academics and to provide attractive infrastructure to support them. Universities need increased public funding.

More than two decades ago the Commonwealth Tertiary Education Commission noted that the rapid expansion of higher education in the 1960s and early 1970s had led to a demographic bulge in the academic workforce, and that this bulge was concentrated in an age group that would reach normal retirement age some time in the first decade of the 21st century.

Confirmation of the international nature of this demographic shock comes from a series of reports highlighting potential imminent problems in academic recruitment in the United States, Canada, the UK, New Zealand, Sweden and a number of other European countries.

However, not all areas within the Australian university system will experience this demographic shift. The bulge is predominantly concentrated in areas such as education, arts and parts of health, and there are significant variations among universities in their age profiles even within the same fields. Research staff tend to be younger, as are the age profiles of fields of study which arose after the 1980s, such as information technology. Table 1 illustrates this variation by showing the proportion of academics aged over 50 in 2003 in broad fields of study for a selection of five universities.

Table 1: Percentage of full-time/fractional academic staff aged over 50 years in 2003: selected universities and fields of study

University and type	% of all FTE aged 50+	% of non-research-only FTE aged 50+	Percentage of FTE aged 50+ excluding research-only (minimum 50FTE only)						
			Science	IT	Health	Law	Society/Culture	Education	Business
A. Go8	32	43	41	23	40	36	51		40
B. ATN	45	51	52		33		47	72	52
C. IRU	38	40	33	42			42	70	31
D. IRU	46	51	58		42		57		36
E. ATN	40	43	54	30	41	32	34	56	45

Source: DEST staff dataset

In the past we have gone through major recruitment challenges in higher education. The increases in staff numbers that accompanied the expansion of higher education after 1960, and then again over the past twenty years, were achieved to a large extent by drawing on overseas applicants, in the first wave from the United Kingdom and other Commonwealth

countries, and subsequently from a wider international pool and assisted by liberalisation of entry requirements, and also by an increase in the number of research student places, although significant numbers of those were taken up by existing academic staff. Another factor was a downturn in the economy in the early 1990s, which aided the relative attractiveness of the academic profession.

It is difficult to generalise about the possibility of academic labour shortages arising from the coming demographic shock, and the consequent impact on Australia's research capacity. Where student demand for particular subject areas is low, universities can take the opportunity to restructure their workforces to ensure their sustainability. Where demand is sustained or increases, the key issues are to do with the availability of suitable quality replacement candidates, and that in turn depends on the relative attractiveness, domestically and internationally, of the university and the academic profession.

As is the case with teaching, nursing and a number of other professions, the **relative salary position of academics** has been significantly affected by the returns offered to skilled professionals in the wider economy over the past three decades. A report commissioned by DEST in 2005 examined academic salaries relative to average weekly earnings over the period from 1977 to 2002 and found that they had declined across all levels, but with the greatest decline for the most senior academics. A professor's salary, was 3.2 times greater than Average Weekly Earnings (AWE) in 1977 but in 2002, it was only 2.4 times greater. The report also noted that this decline happened rapidly over the 1980s, but slowed from 1990, a point which may well bear on the pessimistic views in the late 1980s about the future of the academic labour market. A more interesting comparison would be with professional salaries; however, these are not readily available before 1997.

Over recent years Australian academic salaries have more or less kept pace with those in other professions, particularly professional positions in the private sector. International comparisons are fraught with difficulties, and international relativities can shift quickly, but the available evidence suggests that while Australian academic salaries are significantly behind those in the US, Singapore and Hong Kong, they clearly exceed those in New Zealand and are broadly competitive with the UK and Canada.

However, universities face fundamental challenges in maintaining broad salary relativities while also attracting the most productive staff. **People with scarce skills command higher wages, and such scarcity is particularly prominent in research.** The Research Assessment Exercise prompted waves of poaching and star recruitments in the UK, and there were clear signs that the Research Quality Framework (RQF) and moves to deregulate industrial relations under the previous Government provided opportunities for valuable staff to exercise leverage over salary and conditions. This is not necessarily bad for the sector, particularly when highly skilled people are able to be attracted from overseas. However, it does heighten the risk of fiscal unsustainability, particularly when the looming retirement wave will require replacements across the board.

There is much that can, should and is being done by universities to prepare for the future. **Workforce planning**, particularly for the areas of the university with older age profiles, needs to anticipate as best as possible when retirements might occur and to gauge future staffing needs in the light of anticipated demand and strategic direction. At QUT, we developed an Early Career Academic Recruitment and Development program in 2004 which provides structured and comprehensive programs to develop the teaching and research skills of new academics, as well as support programs and opportunities to develop strong networking and collaborative relationships. This program has an annual recruitment round which has attracted relatively large pools of candidates. The last two rounds (06/07) have attracted over 1000 candidates for 65 positions. The success of this program demonstrates that structured programs that deliver a fast track entry to academia are attractive to early career academics. This program could be significantly enhanced and its success replicated across the sector with an injection of Commonwealth funding.

Recommendation:

10. Commonwealth funding to facilitate the further development of the QUT ECARD program and replication of the program across the sector.

The principal challenge for the Australian higher education system over the coming decade relates to the capacity of Australian universities to attract the best academic talent, particularly at the younger levels. Such talent cannot be solely lured on an individualised basis, by offering expensive packages designed to counter the returns people might attain in the wider workforce. Part of the attraction of a university for productive academics will be the nature of the university community within which they and their colleagues work, including the nature of university-wide facilities and infrastructure.

In this respect it is again clear that Australia's research capacity is intricately tied to the general funding flows to universities. Firstly, public universities remain heavily dependent upon government funding for their operating purposes, which is the source of the salary costs for teaching/research academics; and secondly, while a number of universities have successfully sourced non-Commonwealth sources for infrastructure development, the Commonwealth investment in campus facilities and infrastructure must increase if researchers are to be attracted to and retained in university settings. Ultimately, unless universities have adequate baseline recurrent funding, Australia's research capacity remains at risk.