

To: The Secretary of the House of Representatives Standing Committee on Industry, Science and Innovation

Email: [ir.reps@aph.gov.au](mailto:ir.reps@aph.gov.au)

Phone: (02) 6277 4594

FAX: (02) 6277 4516

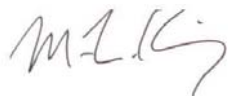
From: Professor Max King  
Convenor, Australian Council of Deans and Directors of Graduate Studies

Re: Inquiry into research training and research workforce issues in Australia

Date: 29 May 2008

Recognizing the importance of research training to our national and knowledge economies, the Australian Council of Deans and Directors of Graduate Studies (DDOGS) applauds the review of research training and research workforce issues in Australia. We are keenly conscious of the contributions made by higher degree by research students to innovation, new knowledge and Australia's productivity and competitiveness, and are consequently pleased to submit the following response to the Standing Committee's Review.

As a consortium of university leaders and policy makers regarding research training, the DDOGS are keen to participate in forums, workshops or other consultations to expand on any of the issues outlined below. I would be happy to coordinate input from the full Council or the Executive Group. I would also be happy to meet with the Standing Committee to discuss this submission or any issues the Committee may wish to raise.



Professor Max King  
PVC (Research and Research Training)  
Monash University  
*and*  
Convenor  
Australian Council of Deans and Directors of Graduate Studies

Email: [Max.King@adm.monash.edu.au](mailto:Max.King@adm.monash.edu.au)

# **Inquiry into Research Training and Research Workforce Issues in Australian Universities**

## **Submission from the Australian Council of Deans and Directors of Graduate Studies (DDOGS)**

### **Research Training Contributions to the Global Knowledge Economy**

To participate strongly in the global knowledge economy, Australia needs to develop outstanding innovation and knowledge workers, both within and beyond the academy. Research training programs not only contribute directly to the creation of new knowledge through original research and its dissemination but cultivate innovative thinking and outstanding leadership and management skills as prerequisite outcomes of such training programs. Universities have a responsibility to provide higher degree by research programs which offer the breadth and transdisciplinary experiences required to foster within highly able individuals the ability to address the complex and interdependent characteristics of our knowledge society.

As well as creating the next generation of researchers and knowledge workers, research training programs and students also significantly contribute to research currently underway. In many disciplines they are significant contributors to established research teams, the engines that keep the research programs going and the co-authors that contribute greatly to publication output.

To recruit, train and maintain new high quality researchers, Australia's universities must stay at the international forefront of research training. The quality and reputation of Australia's research training programs are well recognized but with the global massification of higher education and the increased mobility of students, continued and increased investment is required. If Australia is to be competitive in an increasingly global market for research talent, there are a number of problems with our current system of research training that will need urgent attention.

### **Challenges Facing Australian Universities: The Research Training Scheme (RTS)**

Since the introduction of the RTS in September 2000, Australian universities have responded positively and significantly enhanced the quality and responsiveness of their programs. This has improved labour market relevance and improved the efficiency and effectiveness of their research training. The structure of the scheme has focussed attention on completions and encouraged supervisors to stimulate students to publish.

As half the RTS money comes from performance in grants and publications, there is an improved alignment with research training and areas of research competitiveness, encouraging nodes of research and research training excellence. Inclusion of international student completions in the funding formula has encouraged universities to invest in international students many of whom stay in Australia and make long-term contributions to Australia's research.

With the growing awareness of the diversity of employment outcomes following the PhD and the importance of transferable skills to future employers, Australian universities have enthusiastically responded to the development of generic skills and the broader support needs of research students.

In almost 8 years however, the total pool of funded HDR places has not increased at all. In the absence of additional funded places, many universities over enrol their RTS allocation and since the numbers of completions have also increased very substantially, the funding per capita for enrolments and completions has diminished significantly.

The static number of RTS places does not reflect the increase in population and Australia is therefore moving further away from other OECD countries in terms of the numbers of PhDs per head of population. The current data for Australia is 5.9 doctoral holders per thousand which is below Canada, 6.5, Germany 15.4, Switzerland 23.0 and the USA 8.4<sup>1</sup>.

Additionally there is strong local and international evidence that the levels of RTS funding falls well short of the full cost per student of delivering HDR programs, both at the high band and the low band levels. The arbitrary division between “high-cost” and “low-cost” disciplines is not based on any recent analysis of the costs of supervision and research. Programs are also currently operating with unpaid external supervisors, a hidden and unmet cost of delivery.

A report to the Higher Education Funding Council of England (HEFCE)<sup>2</sup> observed that the annual costs per FTE student ranged from UK £17, 461 (AUD\$37, 094) to £29,106 (AUD\$61, 823).

Recent studies by Monash University<sup>3</sup> compared the costs and return of HDR endeavours in various faculties:

Table 1

<b>Year</b>	<b>Cost Centre</b>	<b>HDR Revenue per EFTSL</b>	<b>HDR costs per EFTSL</b>	<b>Variance</b>
2005	Science	\$27,756	\$33,513	-\$ 5,756
2006	School of Rural Health	\$36,905	\$56,377	-\$19,472
2008	Art & Design	\$15,166	\$29,000	-\$13,833
2008	Information Technology	\$17,091	\$37,804	-\$20,712

A significant increase is required to address this anomaly. The Council for Humanities and Social Sciences (CHASS)<sup>4</sup> also report that the differentiation between funding and the real cost of low cost band program delivery is also

<sup>1</sup> Auriol, L. (2007) Labour Market characteristics and international mobility of doctoral holders: results for seven countries, DSTI/DOC(2007)2,OECD

<sup>2</sup> JM Consulting Ltd in February 2005

<sup>3</sup> Max King, PVC Research and Research Training, Monash University, April 2008.

<sup>4</sup> Workshop on PhDs in the Humanities, Arts and Social Sciences, Sydney, March 2008.

significant. Further review is also required to ascertain the relevance of the current high cost/low cost categorizations.

The current system of partial RTS funding with subsidy coming from undergraduate and graduate coursework activities is not sustainable. Funding for research training should meet real costs and be internationally competitive.

*Recommendation 1:*

*The DDOGS recommend an increase in the number of RTS places available to Australian universities.*

*Recommendation 2:*

*The DDOGS recommend funding the full cost of each HDR program and abolishing the somewhat arbitrary high cost/low cost divide.*

It is well recognized that PhD mobility between institutions, nationally and internationally, improves the breadth and quality of research training and the possibilities for employment and collaboration after completion. We need to improve opportunities for PhD mobility. Joint PhD programs are gaining profile and relevance internationally but nationally the RTS does not credit completion to more than one university. This is a strong disincentive to cross-institutional co-supervision and collaboration, a hindrance to the mobility of Australian research and the national research workforce, and a barrier to the broadening of the PhD experience.

*Recommendation 3:*

*The DDOGS recommend that the RTS scheme funding formula be modified to allow the splitting of HDR completions between Australian universities in order to recognise joint provision of PhDs.*

The emphasis on completions, grant income and publications also has the potential to cause some unintended consequences in some institutions, bringing an uncertain alignment of funding to quantity rather than quality. Universities may be reluctant to discontinue candidature of weak students in the hope of gaining a (possibly lesser quality) completion. The use of external examination systems is a good guarantee of quality of thesis but not necessarily of the student. Additionally, the system of payment of RTS in arrears makes it difficult for universities to invest in research training in new areas.

### **Challenges Facing Australian Universities: Scholarships**

In a competitive world market, current Australian HDR scholarships are inadequate both in value and duration. Globally institutions are offering more attractive packages to the best and brightest students. As an example, the Canadian government recently

announced funding for a new PhD scholarship program. The government's two-year, CAD\$25 million commitment to the Georges Vanier Scholarships will support 500 PhD students from Canada and abroad for up to three years at CAD\$50,000 per year. The DDOGS applauds the recent federal budget announcement that the government will increase the number of new Australian Postgraduate Award (APA) scholarships provided from around 4800 in 2008 to 9600 by 2012. However, at around \$20,000 per annum tax free, the value of PhD stipends paid under the scheme is considered insufficient to meet the living expenses of students; it is certainly not competitive in an era of high employment, particularly in disciplines like engineering and earth sciences. Ryland, 2008<sup>5</sup> reports that sixty-six percent of students worked at least two hours a week whilst studying, including fifty-eight percent of students who were on scholarships.

The value of these scholarships has not kept pace with inflation and the Council for Australian Postgraduate Associations (CAPA) has reported that the stipend rate for APAs will slip below the poverty line by the end of 2008<sup>6</sup>. A significant increase is required as well as an indexation process to maintain parity for the future.

*Recommendation 4:*

*The DDOGS recommend that APA stipends are increased by at least 30% per annum; that they remain tax free and that they are appropriately indexed in future.*

The current average completion time for a PhD is over 3.5 years and scholarship funding is not aligned with the RTS scheme. The DDOGS share the view of the Council of Australian Postgraduate Associations that stipend funding should cover the full candidature time supported by the RTS. At three years, with a possible extension of six months, the duration of the APAs is generally considered too short to allow for a reasonable completion time, particularly if coursework and enrichment (breadth) components are contemplated.

*Recommendation 5:*

*The DDOGS recommend an increase in the length of APA funding to 3.5 years with the possibility of a six month optional extension on academic grounds.*

### **Challenges Facing Australian Universities: Attracting and Supporting High Quality Internationals**

Not only is there a need for the total doctoral quantum to increase and specific measures to address the decrease in commencing<sup>7</sup> Australian students, we also need to ensure that we attract, enrol and maintain a strong international cohort. Australia is in a global market for research talent and we want to be able to attract the brightest and best to our shores to do PhDs.

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<sup>5</sup> Ryland, K. 2008. Further analysis of the result of the ARC Linkage project: Reconceptualising the Australian doctoral experience, In Zammit, F: Personal Communication.

<sup>6</sup> CAPA Media Release: APAs to Break Poverty Line. April 30 2008.

<sup>7</sup> Go8 Backgrounder – Researcher Supply and Demand – no 3, November 2007.

There were 7094 international HDR students enrolled in 2007, an increase of 14% from 2006. Whilst this goes some way to compensate for the current decline in domestic student uptake, there are added internationalization benefits to be gained by diversifying the HDR cohort – both to improve the potential for future research collaboration and to broaden and improve our research training communities.

To increase the pool of potential new researchers and their contributions to new knowledge, Australia has a great opportunity to improve the intake of high quality international HDR students. Optimising and promoting the benefits of a single, national higher education system with consequent quality control and uniformity as well as areas of expertise and research excellence, Australia is well placed to attract the best and brightest from overseas. The demand for available places is strong. However, we are competing against well funded scholarships at international universities and hampered by inadequate and under funded international scholarship schemes. As well as the Canadian Georges Vanier Scholarships which have been described as a “marquee graduate scholarship program aimed at attracting young academic superstars to Canadian campuses”, the move by the New Zealand government to attract international students by reducing fee rates to domestic levels also places Australian universities at a significant disadvantage.

In order to attract high quality international candidates we need to raise both the value and number of International Postgraduate Research Scholarships (IPRS) which pay the tuition fees for our best international students. These have substantially declined when we should be increasing them in line with the increased number of international students. As noted by the Group of Eight, there were 300 new scholarships per year available in 1996. This increased to 330 per year in 2002 (with no extra funding) and when the available funding was found not to cover scholarship cost, money was clawed back from universities. Universities now receive a financial allocation and the Group of Eight estimates that this funding would cover just 228 new scholarships annually or 69% of the advertised tuition fees.

Additionally, the suite of international postgraduate scholarships offered under the Endeavour program is complex, confusing and poorly targeted. The scheme needs to be reviewed, rationalised and simplified to provide a core set of high quality, internationally competitive scholarships that fully-fund living and training costs . Similar concerns are held about the AUSAID suite of scholarships.

*Recommendation 6:*

*The DDOGS recommend an increase in the number of IPRS awards to reflect the growth in the international student cohort and that each award fully funds the fees payable by the student.*

*Recommendation 7:*

*The DDOGS recommend a review of the suite of Endeavour Scholarship Programs to improve the accessibility and international competitiveness of the scheme.*

Other barriers to growing Australia's intake of high quality international students include visa accessibility and timelines for both entry and candidature/scholarship extension. Valuable internationally funded scholarships can be placed in jeopardy by delays in the issuing of visas or the extension of these when students change or extend their programs. The DDOGS recognise the support provided by the Department of Immigration and Citizenship but seek further understanding and flexibility in the cases of sponsored students. Similarly more autonomy for universities to decide on English requirements for HDR students (as has been shown in this regard to Iraqi government funded students) would enhance the opportunities to attract students.

### **Supporting Australia's Anticipated Future Requirements for Tertiary-qualified Professionals in a Wide Range of Disciplines**

The nature of research training is changing as it responds to national and global needs. Graduate outcomes are diverse as we prepare students for a range of employment opportunities and careers. Research and innovation is fostered in industry, commerce and academe and HDR programs need to improve the skills and readiness of our graduates to work in an interdisciplinary and internationally collaborative workforce. The Western et al. study<sup>8</sup> reported that students felt able to work at the frontiers of their disciplines and were able to contribute to scholarship and research but were less convinced that they acquired the team based and other generic skills relevant to their careers.

Australian universities have responded by recognising and supporting the identification and development of these attributes. Many innovative and effective programs are being offered to students throughout their candidature. But the supply of these graduates destined to become the research leaders of our future is not keeping pace with demand. The percentage of the population completing a HDR in Australia is declining in an era when many other countries are increasing their investment.

Australia is not keeping pace with other OECD countries in regard to research training output. The Group of Eight reports that Australia is producing only 2.3 doctorates per 100 university graduates compared with 3.9 in Canada, 10.1 in Switzerland and 11.2 in Germany.

The Group of Eight also reports that there has been a 29% decline in HDR domestic commencements since 1995 - from 8298 to 5885 in 2006, with particular shortfalls in students commencing PhDs in earth sciences, environmental studies, mining-related engineering, accounting, banking and finance.<sup>9</sup>

As well as the inadequate levels of support available for candidates, the current Australian employment market and availability of high salaries for commencing graduates exacerbates the challenges in attracting quality candidates. In Australia, employment in scientific and engineering professions is growing more than twice as fast as the workforce as a whole<sup>10</sup>. In Queensland, employment in these professions is

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<sup>8</sup> Western et al. , (2007) Survey of Graduate's Employment Outcomes - 5 to 7 Years Out. University of Queensland.

<sup>9</sup> Go8 Backgrounder – Researcher Supply and Demand - no 3, November 2007.

<sup>10</sup> Professor Peter Andrews, Queensland Chief Scientist webpage  
<http://www.dtrdi.qld.gov.au/dsdweb/v3/>

at 1.3 times the national rate and the percentage of domestic science and engineering graduates is falling.

Queensland Chief Scientist Peter Andrews estimated short-fall of 75,000 PhDs in the enabling sciences by 2010 a few years ago<sup>11</sup>. His web page states that world-wide demand for people with science, engineering and technology (SET) skills has grown substantially and he notes that the United States has already called for an additional 2.2 million scientists and engineers and the European Union has projected the need for an additional 700,000.

Undergraduate enrolments in enabling disciplines (especially science) have been steadily declining for a number of years, creating a supply problem for research candidature. Investment in science education and support for research pathways are important elements which must also be considered in a review of research training and workforce issues.

### **Diversity of the HDR Cohort**

Whether the diversity of the doctoral student population has increased with the growth of the doctoral education is arguable (Pearson, et al. 2008)<sup>12</sup>, but the fact that the current population comes from a wide range of age, social background, work experience and family circumstances is not (Ryland, 2007)<sup>13</sup>. In 2005, sixty-four percent of the doctoral student population were over thirty years old, eighteen percent were international and thirty-eight percent were part-time (Ryland, 2007). On the latter point it cannot be assumed that doctoral candidates stay either as full-time or part-time, as by four years of enrolment nearly fifty percent had changed their enrolment status at least once (Ryland, 2007). Further analysis by Ryland of the results of a ARC linkage project on reconceptualising the doctoral experience also showed that over fifty percent of doctoral students had partners and twenty-seven percent had dependent children. In addition, sixty-six percent of students worked at least two hours a week whilst studying, including fifty-eight percent of students who were on scholarships (Ryland, 2008)<sup>14</sup>.

Doctoral students come from a wide variety of social-economic background as illustrated by their parents' qualification, forty-one percent of their highest qualification was at school level and thirty-seven percent of doctoral students' parents held a university qualification. It can also be argued that doctoral students bring with them considerable transferable skills from their workplace. For example, forty-eight percent of students felt that they brought with them project management skills and this rose to fifty-nine percent of part-time students (Ryland, 2008).

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<sup>11</sup> Professor Peter Andrews, Queensland Chief Scientist webpage  
<http://www.dtrdi.qld.gov.au/dsdweb/v3/>

<sup>12</sup> Pearson, M., Evans, T., Macauley, P. 2008, *Growth and diversity in doctoral education: assessing the Australian experience*. Higher Education (2008), 55(3), 357 – 372

<sup>13</sup> Ryland, K. 2007, *Reconceptualising the Australian doctoral experience: work, creativity and part-time studies*, PhD Thesis, Deakin University.

<sup>14</sup> Ryland, K. 2008, *Further analysis of the result of the ARC Linkage project: Reconceptualising the Australian doctoral experience*, In Zammit, F: Personal Communication.



It is important to recognise and respond to the diversity of the HDR cohort, their ages, prior study and employment experiences, their skills and attributes sets and needs and the varied motivations for undertaking a research degree. One size does not fit all in either describing or meeting the needs of research students and funding schemes, research programs and support mechanisms must respond to this.

### **Industry Training Schemes**

Research links with and pathways to employment in industry are vital to both universities and research candidates. Whilst there is a wide range of programs that support industry training, they are varied in their effectiveness and disjointed in their coverage of student and research needs.

There are opportunities for valuable cohort support within Cooperative Research Centres (CRC's) but CRC investment in research training has declined, especially with the demise of public good CRCs. The Commonwealth Environment Research Facilities (CERF) program does not have the same incentives to invest in research training. The APA (Industry) program enables the links to industry but lacks the potential for cohort development and support afforded to CRC candidates.

The Commercialization Training Scheme is another initiative where interdisciplinary skills training aims to enhance PhD programs, outcomes and contributions to the global economy but questions have been raised about the timing of this training and the lack of extended opportunity to work with stakeholders. The success of these programs is mixed and a comprehensive review of the mechanisms for enhancing industry links with PhD programs is due.

*Recommendation 8:*

*The DDOGS recommend a full review of the suite of government funded programs which provide support for industry links for PhD students.*

### **Challenges in Training, Recruiting and Retaining High Quality Researchers (Graduates and Staff)**

#### *Pathways to Research Training*

The DDOGS note the importance of honours programs as a pathway to higher degree programs for domestic students. Whilst honours programs vary between institutions and disciplines, the availability of an additional research component in an undergraduate program is vital to the future of research training in Australia. It is this exposure to the research experience that opens many students' eyes to HDR as a research option and then provides both a strong intellectual grounding for future students as well as a mechanism to assess research ability before embarking on a full PhD or research masters degree. The DDOGS emphasize the need to maintain and possibly strengthen honours programs and the centrality of continued federal funding for this pathway into research training.

### *Beyond HDR Programs*

It is important to note that research higher degree programs, whilst critical, are only one part of the suite of research training opportunities available. Early career researchers (ECRs) both in academe and industry, continue to require support, mentorship and skills training. Program and income support issues associated with HDR students have been detailed above but a similar set of challenges beset the training, recruitment and retention of early career researchers in Australia.

*Academic Workforce and Australia's Research Capacity.* There is a growing need to resource the future academic workforce to support our higher education across Australia. Graeme Hugo's work<sup>15</sup> on staff needs for Australian universities outlines the declining academic workforce and notes that two thirds of Australia's academic staff are over 40 years of age and universities are likely to lose between a fifth and a third of their staff in the next decade or so. The long "lead times" to attract and train doctoral candidates, coupled with the increasing diversity of employment outcomes for PhD graduates result in an impending crisis. The Go8 has estimated that Australia needs to graduate at least 800 more PhDs per annum simply to maintain the number of PhD graduates within our academic workforce, before allowing for the projected (and economically imperative) growth in higher education enrolments.

### *International Competition*

Graeme Hugo<sup>16</sup> reminds us of the recent unprecedented internationalisation of the academic labour market. Competition for "star researchers" and high quality research students is fiercely competitive, both to attract internationals and retain the best of our own. With modified immigration regulations, it has never been easier for highly skilled Australians to move to positions in foreign countries, especially other OECD nations. Strategies are clearly needed to retain our best students and researchers as well as attract internationals to Australia.

### *Disincentives for Career Choice*

The enthusiasm to pursue a research career generated during candidature can be moderated by financial, job security and other pragmatic issues. Many research positions are funded by project funds ("soft money"), again denying the job security often sought by graduates, especially those who have been previously employed prior to embarking on a research degree. This disincentive is heightened for the average PhD graduate who is in their mid 30's – with associated financial and family commitments to meet. Additionally, current measures of research performance and excellence are dependant on continuity of service and research output. This is especially difficult for women who wish to interrupt their career for family reasons, particularly in lab and field-based sciences.

### *Postdoc Support*

Post-doctoral fellowships are the most common form of apprenticeship into a university research career but they are in short supply and only for three years. This lack of availability and guaranteed tenure can discourage applicants but also result in some post-docs spending much of the last year unproductively looking for a new job.

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<sup>15</sup> Hugo – Workshop on PhDs in the Humanities, Arts and Social Sciences, Sydney, March 2008.

<sup>16</sup> Hugo – Workshop on PhDs in the Humanities, Arts and Social Sciences, Sydney, March 2008.

### *International Collaborations*

International exposure and global collaborations are as important for ECRs as they are during candidature. Australian universities are certainly proactively establishing research collaborations and developing networks that can be accessed by beginning researchers. It is important that mechanisms are in place and inclusive intellectual communities are established that enable ECRs entrée into these networks and introductions to appropriate international contacts. Funding is needed to support international collaboration (both face to face and virtual through appropriate infrastructure). The latter is particularly important for ECRs with family responsibilities especially if dual careers make it difficult for partners to work.

### *Attracting International Academics*

Finally, as much as we can “grow our own” high quality researchers, there is benefit in attracting both high quality international research students and established researchers. The challenges in attracting international students have been addressed earlier in this paper but universities face similar problems when competing internationally for high quality established researchers. Academic salaries are comparatively low by international standards and lack of housing availability and the higher cost of living and accommodation in some cities are additional disincentives. Coupled with a high level of project-funded, fixed-term positions and consequent lack of security, some universities are experiencing significant difficulties in attracting international research talent to our shores.

### **Other Challenges in Research Training**

Australian universities, individually and through the DDOGS network consistently strive to improve the quality of our PhD programs. Several seminal research projects have been undertaken in recent years, including the Holbrook team’s work on examination outcomes<sup>17</sup> and the Western et al. project on graduates 5-7 years after graduation and quite a few other projects have been completed or are underway which have significantly contributed to our understanding of research training and the identification of best practice. However this effort is often hampered by a lack of consistent and accessible data. Differential student systems and measures of performance make focussed research difficult. As a nation we need to improve our data about Australian research training and conduct research on Australian research training.

#### *Recommendation 9:*

*The DDOGS recommend that the government supports an active research agenda to inform quality improvement in HDR programs and outcomes.*

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<sup>17</sup> Bourke, S., Holbrook, A., Fairbairn, H., & Lovat, T. (2008). Consistency and inconsistency in PhD thesis examination, *Australian Journal of Education*, (in press, accepted 20<sup>th</sup> September, 2007).