

**Submission to the
House of Representatives
Industry, Science and Innovation Committee**

**Inquiry into research training and research workforce issues
in Australian universities**

Introduction

Griffith University welcomes the opportunity to provide input to the inquiry into research training and research workforce issues in Australia. As a comprehensive research university, Griffith offers research training to students in all of its academic organisational units. The University has experienced more than a doubling of its Higher Degree by Research (HDR) completions from 82 in 1999 to 174 in 2007. This rate of growth is reflected across all major discipline groupings of the University and more so in Health where completions have grown from just 8 in 1999 to 37 in 2007.

The University is strongly committed to the provision of a high quality research training environment and has taken decisive action to support this commitment. Since 2002 the University has established the position of Dean, Griffith Graduate Research School and the Griffith Graduate Research School which offers a central support and advisory service for academic staff members and HDR students. The University has also restructured its research centres and provided significantly increased funding to enable more efficient and effective provision of infrastructure, resources and supervision to researchers and HDR students. The success of these initiatives is reflected by the University's improvement (2003-2006) in rates of 'overall satisfaction' for HDR students as measured by the Postgraduate Research Experience Questionnaire.

Australian universities with a similar commitment to research training have introduced initiatives like those described above. These have coincided with important policy changes by the Commonwealth. Following the introduction of a completions component into the Commonwealth Research Training Scheme (RTS) formula in 2001, HDR completions have risen markedly. International doctoral enrolments and completions also rose when incorporated into the RTS formula. It is however becoming apparent that these important policy changes might have achieved their full impact as HDR student commencements stagnate throughout Australia.¹

The nation needs new incentives and mechanisms to encourage more talented young Australian graduates to consider research higher degree training rather than the alternatives. Although international HDR student enrolments are climbing and now represent around 19% of all HDR students, these students are generally more time intensive with additional expectations to domestic students. The emerging challenge for universities is to attract and retain domestic and international RHD students by providing them with a high value-added research training environment. HDR students now expect an enhanced support package laden with top-up scholarships, opportunities for future career development such as internships, commercialisation training, international opportunities and other career-orientated skills training.

The consequences of inaction are detailed in a Group of Eight background paper released in November 2007 titled, *Researcher supply and demand*. The paper predicts future shortages of PhD graduates not only in universities but also into key industries in the fields such as environmental sciences, earth sciences and mining engineering, accounting, banking and finance, and health sciences (notably dental, optical and radiography studies). This submission extends the observations of the Group of Eight paper by outlining pressure points and suggesting practical ways of achieving the expansion needed in high-end knowledge skills required for Australia to remain internationally competitive.

¹ Statement evidenced by Department of Education, Employment and Workplace Relations, Students 2006 [full year]: selected higher education statistics – commencing students.

A value-added PhD experience – Dr Rod Eastwood

An example of a value-added PhD student experience at Griffith University is provided in [Attachment One](#).

After a career as a production engineer, Dr Rod Eastwood pursued an undergraduate degree and PhD in evolutionary zoology at Griffith University. During his PhD studies he was awarded a Fulbright Fellowship which allowed him take a private collection of 15,000 butterflies to Harvard University's Museum of Comparative Zoology to receive the highest standards of care. This is now the largest collection of Australian butterflies outside of the Australia and the British Museum in London. Since graduating from Griffith University, Dr Eastwood has returned to Harvard University as a senior curator at the same Museum. This case not only illustrates the value-added PhD experience but also reveals the significant research impact that PhD students can make during the course of their studies.

How competitive is Australia in research training?

One starting point is to ask whether the Australian PhD is attractive against world standards for provision of support for HDR training. Good evidence is obtained from the U.S. *Study of Earned Doctorates Report 2006* which presents data on the 45,596 recipients of research doctorates awarded by 417 U.S. universities. The report reveals that:

- Research doctorate completions rose 5.1 per cent from 2005;
- Thirty-seven percent of research doctorate completions were earned by students from overseas ranging from 68 per cent in engineering and 53 per cent on physical sciences to just 13 per cent in education.
- Median time to degree completion since receipt of baccalaureate was 9.5 years;
- Median time to completion since first enrolment in any graduate program was 7.9 years;
- Seventy-four percent of those completing received support for their programs including university fellowships or teaching and research assistantships;
- Fifty-two percent reported no educational indebtedness at the completion of their doctorate while 13 per cent reported cumulative education-related debt levels of \$50,000 or more.
- Almost two-thirds of foreign PhD students are financed by scholarships or work in universities. By contrast, less than 25% of international graduate students in Australia receive any support from Australian sources according to the Group of Eight background paper.

This report confirms that research students in the U.S. are twice as likely to come from overseas, take more than double the time to complete PhD studies compared to their Australian counterparts, are more likely to receive some form of funding support, and less likely to finish their PhD in debt. International graduates in Australia account for only 19 per cent of PhD completions against almost double that percentage in Switzerland, the U.S., and the United Kingdom.

Clearly Australia is not yet perceived overseas as a first tier option for PhD studies given that only 4.2% or 7,503 of Australia's 177,760 international university students are enrolled in doctoral programs.² This is not the case in many OECD nations where a much higher proportion of international enrolments are at the PhD level and where a majority are provided with scholarships.

For as long as there are genuine shortages of domestic PhD students more can be done to support recruiting a significantly higher proportion of research higher degree students from overseas on scholarship. Many OECD nations achieve their strong PhD success by attracting high numbers of international students on scholarship. Australia would need to double its Numbers of PhD students from overseas to be competitive with the U.S. and at least double the number of these on fee scholarships.

² Australian Education international, Research Snapshot, Number 31, March 2008

Recommendation 1

Griffith University recommends that:

Australia set a target of up to 40 percent of all commencing PhD students to come from overseas within five years, provided this is accompanied by more collaborative arrangements with high quality international partners and does not diminish national commitment to domestic PhD provision ; and

International Postgraduate Research Scholarships (IPRS) should be doubled to 700 per year by transferring 1,400 of the new 4,800 Australian Postgraduate Research Awards over a four year period.

Providing better support for domestic HDR students

The Group of Eight 'backgrounder' paper *Researcher supply and demand* spells out some disturbing trends in research training.³ Australia is producing only 2.3 new doctorates per 100 university graduates compared with 3.9 in Canada, 10.1 in Switzerland and 11.2 in Germany. Low numbers of PhD students are enrolling in some areas which are critical for Australia's competitiveness including earth sciences, accounting, finance and business, environmental sciences, and several health sciences including dentistry and radiography. Young people may be attracted into PhD programs and to academic and scientific careers by increasing PhD stipends, by offering more secure career paths post graduation, and through provision of stronger generic skills training, coursework opportunities, internships in government and industry, and international opportunities.

The Group of Eight paper also provides strong evidence that the academic workforce will struggle to replenish itself given the projected retirements in the order of 1,725 per annum (2006-2016) alongside a supply of PhD graduates to the academic labour market of 906 per year. The figure of 906 is based on the estimate of 27.4% of PhD graduates (4,250 per year) entering the academic workforce. This issue has serious downstream implications for the provision of research-led teaching and supervision of HDR students and needs to be dealt with for the health of the university sector.

There are several means available for the Government to encourage higher uptake of PhD study including increasing the annual Australian Postgraduate Awards (APA) stipend rate and the tenure of the stipend. Figures released by the Council of Australian Postgraduate Associations⁴ (CAPA) show that for the first time the stipend rate for APAs will slip below the poverty line by the end of 2008. Griffith University strongly recommends that the APA stipend be reviewed and adjusted upward by a minimum 30 per cent so that it is at least equivalent to the APA (industry) award amount of \$26,140.

Recommendation 2

Increase the APA stipend rate by at least 30 percent (tax free) and extend the length of funding to at least 3.5 years with provision for a six month extension for students to remain on and write-up articles for journal publication.

A further innovative recommendation is for a total remission of the Higher Education Contribution Scheme debt for earlier studies but only upon graduation from the PhD program. There are approximately 4,200 domestic PhD completions in Australia every year. One in three students has a HECS debt of more than \$14,000⁵ indicating the cost of HECS remission for all PhD graduates would be in the order of \$60-70

³ Group of Eight, Go8 Backgrounder No3: Researcher supply and demand, November 2007

⁴ CAPA Media release, APAs to Break Poverty Line, 30 April 2008

⁵ Australian Bureau of Statistics, Year Book Australia, 2008, Feature Article 2: Higher Education Loan Programme and ABS Year Book 2007.

million per annum. Other provisions such as tax rebates against future earnings (post graduation would need to be made for those students who enter their PhD program having made up-front HECS payments.

Recommendation 3

For domestic PhD graduates, introduce a remission of the Higher Education Contribution Scheme debt for previous studies.

A further serious issue is that growth in the number of research training places has stagnated in the last 10 years leaving universities to carry large numbers of unfunded PhD students. In addition the period of time provided to support a funded place was reduced from 5 years to 4 years for a PhD in 2001. This is not the hallmark of a thriving higher education sector and has consequences for the quality of research supervision and the overall quality of graduate outcomes. Additional resources are also needed to extend the period of research training through provision of an enriched experience which might also include a period post thesis submission where a student could remain on and write-up articles for journal publication or perform other scholarly work related to their PhD studies. Such a period would be important to providing new graduates with the time to consider an academic career.

Recommendation 4

That funding of additional places under the Research Training Scheme be designated as a high priority, equal in standing to the provision of additional APAs.

Recommendation 5

It is recommended that the funding period for an RTS place be extended to 4.5 years with an additional six months (i.e. 5 years) possible for students to remain on and write-up articles for journal publication.

Providing more opportunity for domestic HDR students

As mentioned previously the modern PhD student is looking for a value-added experience complete with opportunities for future career development such as internships, possible commercialisation of their research or commercialisation training, international opportunities and sophisticated skills training. Griffith University recommends that every PhD student should have access to such opportunities.

Doctoral internships

One highly innovative model that the Inquiry might wish to investigate is the *Growing the Smart State PhD Funding Program* which is designed to support doctoral research at Queensland universities that can inform public policy development. The grants of between \$1,000 and \$5,000 per annum assist students with expenses related to their PhD projects and final outcomes, but not living expenses or conference attendance. The program aims to enhance evidence based public policy development, make available research outcomes to the Queensland Government to assist policy development, and to develop relationships between universities, students, and the Queensland Government. It is proposed that a program such as this could be investigated as a sub-program of the National Student Internship Scheme proposed by *Universities Australia*.

Recommendation 6

That a PhD in government internship program be considered as a sub-program of the National Student Internship Scheme.

Commercialisation and Industry Opportunities

The Commercialisation Training Scheme (CTS) which first began in 2007 has been relatively successful in this University and we recommended that it continue although not be increased. In our submission to the Review of the National innovation System, the University floated two new concepts: 'Public Space' and Knowledge Transfer Partnerships.

The public space concept suggests that the university sector can best assist business, industry, government and community by provision of conferences and other forms of interaction which allow universities to engage in applied problem solving. Outcomes could include the provision of advisory services, access to specialist equipment or facilities, short courses, consultancy, contract research, or graduate programs. Doctoral students should be an integral part of this activity.

Knowledge Transfer Partnerships (KTP) are a UK concept in which one or more KTP 'associates' (high-calibre PhD graduates) are recruited to work in a particular business on a project that is central to its strategic development. A project may last from 12 to 36 months. The university partner provides its expertise and jointly supervises the project together with a representative from the company. The costs are part funded by Government with the balance being borne by the participating business. The PhD graduate then receives the benefit of the industry position whilst still retaining links with the university and research mentoring from the academic supervisor.

Recommendation 7

That the CTS be retained and that additional means of achieving commercialisation and industry outcomes for PhD students be examined including the 'public space' concept and Knowledge Transfer Partnerships.

International Research Opportunities

Griffith University acknowledges the steps taken by this Government to enhance international engagement in research. The University has already established its own International Research Opportunities Fund which will provide more PhD scholarships to international students and travel scholarships for both domestic and international PhD students on a merit basis. Encouraging PhD student mobility will always carry the risk of non-return however it is becoming increasingly vital that students spend some time overseas to access facilities and research environments not available in Australia, attend conferences and undertake specialised fieldwork. The need for increased international opportunities for PhD students should be borne in mind when parallel discussions occur concerning funding the full cost of research.

Recommendation 8

That Australia develops a policy to encourage mobility for domestic PhD students to encourage them to spend time overseas during the course of their studies. It is recommended that such funding could be negotiated with institutions as part of their compact agreements whereby a university would commit to offering a specified number of international opportunities.

Systemic Issues

There are two final issues which Griffith would like to bring to the attention of the Inquiry. Two recommendations have been made however it should be made clear that the preceding recommendations are regarded as having higher priority than these two.

The first issue relates to the inability under the current system to share the funding for PhD student supervision and completions between two institutions to recognise joint provision of PhDs. It is possible for universities to strike up a joint supervision agreement but in the absence of a nationally agreed model this is cumbersome and time-intensive. Given that student mobility is now a high priority for PhD students it is

strongly recommended that they should have the ability to enrol in two institutions simultaneously with a supervisor at each institution as might occur under an international 'cotutelle' arrangement.

The second issue also relates to mobility and the ability of universities to entice students to change institutions near the end of their candidature with a generous PhD completion scholarship. Such practice is highly unethical and not always in the student's academic interest. It is recommended that this practice be discouraged by requiring universities to pay a 'transfer fee' to the original host institutions should they wish to recruit PhD students that are close to completion.

Griffith University contacts for further information:

Professor Lesley Johnson
Deputy Vice Chancellor (Research)
Griffith University
Kessels Road, Nathan, Qld

Tel: 07 3735 5122 Email: lesley.johnson@griffith.edu.au

Professor Joy Cumming
Dean, Griffith Graduate Research School
Griffith University

Tel: 07 3735 7290 Email: j.cumming@griffith.edu.au

HARVARD GAZETTE, September 2003 – extract reproduced with permission



Rod Eastwood unpacks some 15,000 butterflies at the Museum of Comparative Zoology. He and a friend captured all the specimens during a combined 76 years of collecting. (Staff photos Stephanie Mitchell/Harvard News Office)

Australian butterflies 'invade' Harvard

It's a dazzling, iridescent, spotted, striped, and speckled sight

By William J. Cromie
Harvard News Office

More than 15,000 butterflies from Australia have moved into Harvard's Museum of Comparative Zoology. They wear iridescent blue, green, and silver; boast black, red, and white spots; and flaunt color combinations beyond the imagination of hip fashion plates.

It's the largest collection of Australian butterflies in the United States, representing 76 years of dedicated collecting by two friends. Some of the showy insects have gone extinct since these specimens were captured.

If you imagine geeky guys tripping through spring-gladdened glades with long-handled nets, forget it. One of the dedicated collectors, Rod Eastwood, labored for 30 years chasing butterflies up steep hills in eastern Australia, across the western deserts, and from Tasmania in the south, to the tropical heat of the Northern Territory. On the way, he was bitten by a red-bellied black snake, attacked by bulldog ants, chased by crocodiles, and stranded by swift-flowing rivers.

"The butterflies will be integrated with a smaller collection already here, and the combined holdings will represent the most comprehensive collection of Australian butterflies outside of Australia and the British Museum in London," explains Eastwood, a genial, fit-looking fellow in his mid-50s. "The specimens I brought to Harvard include those collected by my good friend Ray Manskie, who worked at the task for 46 years."



In 30 years of collecting, Eastwood dodged poisonous snakes, ferocious ants, hungry crocodiles, stinging wasps, and flooding rivers - as did his friends.

The butterflies will be used for public displays, education, and studies of everything from their genes to genitalia. Eastwood is working as a Fulbright Scholar in the laboratory of Naomi Pierce, Hessel Professor of Biology and Curator of Lepidoptera (butterflies and moths).

Life changes

For Eastwood, scholarly work on butterflies is a second career. He was a production engineer in plastics and rubber manufacturing for 27 years. Then he decided to learn about butterfly evolution and their genetic relationships. **Eastwood earned his undergraduate degree at Griffith University in Brisbane. After unpacking butterflies and doing research at Harvard during the next 12 months, he will return to Australia to complete his PhD at Griffith University.**

"It's been a bit of a life change," he says with a smile.

Interested in nature since his teen years, Eastwood liked to wander through the bush, collecting not only butterflies, but snakes, opossums, and other creatures. His wanderings involved climbing lots of steep rocky hills.

"If you want to collect butterflies, you've got to climb hills," Eastwood notes. "Many species fly up steep cone-shaped hills to locate mates. Sometimes you'll crest a hill and see hundreds of them flying around. There's a definite hierarchy of flight zones; some prefer treetops, some mid-heights and others stay near the ground.

"You might see a particular stone on a bare patch with a butterfly resting on it. If you collect it, another one of the same species takes its place. Come back year after year, you always find that species on that stone."

Experienced collectors don't always go into net-waving frenzies on hilltops. They often shake the branches or peel the bark to find pupae, the cocoons where the insects make changes from a caterpillar to a winged adult. "You then can breed the insect at home, obtaining a perfect specimen rather than one whose wings may become tattered by a net catch," Eastwood explains.

As larvae, a significant number of butterflies associate with ants. Some species disguise themselves as ant larvae to feast on the ants. Others develop a mutual relationship, a kind of juice scheme. Ants protect the budding butterflies in return for feeding on sweet secretions from butterfly larval glands.

"An unpleasant experience awaits those who collect *Liphyra Brassolis*, a butterfly that lives in the nests of green tree ants," Eastwood warns. "It's a ferocious ant that swarms and bites anything that comes into contact with its nest. They swarm over every inch of exposed skin, biting and squirting acid into the wounds."

Half male-half female

As he carefully unpacks the iridescent, spotted, speckled, gaudy, and grand fliers from wooden boxes, Eastwood provides a running commentary on their habits and habitats. "This one," he says, holding up a white specimen with red spots, "eats mistletoe."

Pointing to a butterfly with one white and one black wing, Eastwood notes, "This one is half male, half female. It has no problem finding a mate. It's also quite rare; you might see one in 200,000-300,000 specimens. I caught this one myself."

The boxes hold skippers, darters, fritillaries, monarchs, and more. One has wings that look like leaves. Another has orange and black on its upper wings, black and silver on its lower wings. Some dazzle, some are plain, but Eastwood can tell you a story about each one. "These monarchs island-hopped across the entire Pacific Ocean," he says with admiration.

Back in his office, Eastwood tells stories about the potential perils of pursuit. Snakes with one of the most potent venoms in the world, called tiapans, share the bush with butterflies. "I've been chased by them, but never bitten," he says. "But I did get bitten by a poisonous red-bellied black snake."

Collecting in the arid Northern Territory, Eastwood sometimes rested in patches of spring forest watered by subterranean streams. "But you must be careful," he comments, "crocodiles frequently lie in the undergrowth during the dry season. They're hard to spot, and you can sit on one without realizing it."

Several times, he was surrounded and attacked by bulldog ants. "Huge ants with large jaws and a nasty sting," he says. "In the far north of Queensland, I think I must have been stung by half the wasp species that live there. Beating them off or running away from a nest doesn't deter them; they tend to attack even more. The options are to stand still and put up with a few additional stings until they lose interest, or leap into the nearest creek or billabong which is often crocodile infested."

Eastwood tells funny stories, too. One time, he was collecting larvae with a Japanese entomologist on the outskirts of a town. The usual way to do that is to spread a sheet on the ground then beat or shake the tree to bring the larvae down. The Japanese collector didn't have a sheet so he used a large umbrella held upside down. He also tied a large handkerchief around his head because it was a hot day.

As he worked at the end of a shady lane, a young couple who was lost drove up to ask Eastwood for directions. The man with the upside-down umbrella and handkerchief around his head came out from under the tree to see what was going on. The couple took one look at him and quickly drove off without waiting for directions.