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# Issues Facing Scientific Research Employment in Australia

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**Do higher research qualifications help or hinder job-seekers? A recent ACER research project sought Australian labour market expectations and impressions from employers and prospective employees.**

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**M**aking the choice to undertake a higher research degree in the sciences in Australia is seen by many current students and recent graduates as a risky decision, especially if the desire is to work in research in Australia following graduation. In concordance with this fear, many employers of scientists in Australia also see higher research qualifications (the PhD in particular) as unnecessary for the type of research being carried out in Australia, especially in the private sector. These are some of the key findings of a research project undertaken by the Australian Council for Educational Research (ACER) for the Federal Department of Education, Employment and Workplace Relations (DEEWR) in 2008.

The study examined national and international literature, mined existing data sources and, importantly, involved interviews and discussions with more than 120 people involved in science training, employment and research across Australia. This article provides an overview of the key qualitative findings to come out of this research. It focuses on the impressions of students and recent graduates about the labour market for people with research science qualifications, and the concurrent expectations of employers and stakeholders in

the Australian scientific community. In the middle of these two groups are the universities themselves, seemingly in a delicate position trying to balance the level of emphasis on both specialisation and generalisation within their postgraduate research programs.

Labour force data from the 2006 Australian Census of Australian Population and Housing show that the unemployment rates of people living in Australia with doctorate qualifications in the natural and physical sciences are particularly low and that the participation rate in the labour force among this population is high. These findings tend to suggest that the labour market prospects for people with these qualifications in Australia are far better than average. Figures relating to the workforce transition of recent graduates (extracted from the Graduate Destinations Survey) also show high levels of articulation into the Australian labour force.

However, despite what the data show, there is still a notable amount of uncertainty about labour force prospects among the students and recent graduates who were involved in this research project. The key concern voiced in this research relates to the perception that there are limited opportunities within Australia to pursue

a scientific research career.

Recent graduates and current research degree students who were keen to pursue a research career in the sciences indicated that they saw only two realistic options for such a career path in Australia: working in the university sector or working for one of the key government scientific research agencies (essentially the CSIRO or ANSTO). In terms of private sector opportunities, the perception among this group was that research jobs suitable for people with a PhD qualification were almost non-existent.

The university research option is taken up by many graduates, and the census data show that the academic occupation is the most common occupation for people with science PhDs in Australia. Such a pathway offers the possibility of autonomous research and the opportunity to provide guidance to students at both undergraduate and postgraduate levels. For recent higher research degree graduates, an initial pathway into the academic profession often comes in the form of a postdoctoral fellowship (the “postdoc”), which is designed to encourage further research focused on specific areas of expertise while working within the university. This pathway has traditionally been taken by young researchers hoping to forge a career in the academic sphere.

However, the students, early career researchers and senior academics who were spoken to in this research almost unanimously indicated that the postdoc was no longer the stepping-stone into academia that it once was due to a decline in the number of tenured positions within universities over recent times. Those participating in the research felt that while customarily students would undertake one or two postdocs (usually 2–3 years in length) to build up a research profile that would provide the skills and experience necessary to gain a tenured university posting, the phenomenon of the “postdoc treadmill” was becoming increasingly apparent.

Researchers stuck on the postdoc treadmill are those who, rather than following the traditional course of completing one or two postdocs in the early stage of their research career, find themselves undertaking many more postdocs due to the lack of permanent opportunities available in academia. Many of the participants noted that the chance of gaining a tenured position declined with each new postdoc

contract. The main reason given for this was that when moving from postdoc to postdoc, opportunities to be involved in a long-term project become limited and engagement in teaching is often lost, meaning that desirability as a candidate for a tenured academic position wanes.

The data relating to employment of university staff, collected and publicly available through DEEWR, provides support for the anecdotal evidence relating to the career prospects in the academic workforce for scientists. The data show that from the beginning of the decade to now, tenured positions in university science faculties, as a proportion of all academic positions, have declined steadily. This decline has been fuelled by a growth in the number of short- and medium-term contracts held by academic staff in universities.

The trends in Australia relating to the prospects for young science researchers are also being seen elsewhere in the world. Recent research in countries such as the UK, the US and Canada suggests that the movement away from permanent positions and towards contract work opportunities in universities has been building momentum over the past decade or so.

This trend leaves many young researchers and students in the process of completing their degrees not enticed by the prospect of an academic career. In addition to the perceived lack of a clear career path (caused primarily by the growing numbers of academics moving from one short-term contract to the next), students saw that their supervisors were heavily burdened and struggled to balance the growing teaching and administrative duties required of people in academic positions with their own research endeavours. One student interviewed in this research, who initially began her PhD to become an academic, had changed her mind on this pathway, seeing the academic career as “competitive, hard work and contingent on short contracts”.

Opportunities in the government-funded research organisations, particularly the CSIRO, constitute the other notable employment pathway for science PhD graduates in Australia. For many early career researchers and students this pathway was seen as desirable, offering good prospects for establishing a strong research profile and providing a clear career trajectory within the organisation. However, the number of

new positions in these organisations is limited, meaning that there are many who do not and cannot follow this pathway.

Within the Australian private sector, employment of research scientists was perceived by students and recent graduates as very rare. While there are people with higher research degree qualifications employed within this sector in Australia, the perception among many current students and early-career researchers is that the opportunities to undertake “real” research are limited. According to many of those involved in this study, the majority of jobs available for scientists in private industry involve repetitive experiments or “custom research”, and no real innovation. It was apparent in the discussions with students, researchers, industry leaders and academics that most of the real research that private enterprise funded in Australia was outsourced to the CSIRO, university research centres, or was undertaken offshore.

Because of the perception that there are limited research career options within Australia, the majority of students and recently completed graduates indicated that they thought their best prospects for employment would be overseas. The perception among this group was that experience working at an overseas university would offer greater chances to be involved in large-scale international research projects and that the opportunities within the private sector were far greater overseas, with many multinational companies having large research and development facilities in the US, UK and Europe. Many of those involved in this study relished the thought of being able to forge a career outside Australia, but others lamented at the situation in which they saw themselves having to leave in order to make use of the skills they had acquired over the course of their university degrees.

Overall, the early career researchers and soon-to-be graduates interviewed in this study appeared to be relatively pessimistic about their chances of pursuing a research career in Australia. The views, experiences and expectations expressed by employers, recruiters and employer stakeholder groups involved in this research seemed to provide evidence to support this pessimism.

Feedback from employers in the science industry and science recruitment firms in Australia strongly indicated that the science

PhD was not highly valued or sought outside the university sector, the CSIRO and ANSTO. A number of reasons were given for this situation.

First, little research with the scope or scale that requires expertise at a PhD level is being conducted within private enterprise in Australia, and thus employers do not seek to hire people with this level of qualification. Second, there is a perception among many employers that the PhD creates people who are too specialised and cannot apply their skills to adapt to the ever-changing conditions of the private market. Third, much of the problem-solving and research needed by private enterprise involves short-term projects that can be more cost-effective if outsourced, often to universities or the CSIRO.

The science employment recruiters interviewed for this research emphasised the lack of interest in the PhD among private industry. In some cases they spoke of times when they encouraged potential job candidates to “hide” their PhD qualifications in their résumé so as not to discourage employers in the private sector from considering them for employment. However, these recruiters indicated that there was substantial demand for science graduates at the undergraduate and Honours level and, as a result, when visiting university careers functions they discouraged those with undergraduate degrees from following the research-intensive PhD pathway.

The high demand for Bachelor and Honours degree graduates in the sciences was also confirmed to be high by many of the science PhD students involved in this research. A number of these students spoke of generous salaries and employment packages offered by large companies towards the end of their undergraduate degrees. Despite these offers, these students had decided to pursue a postgraduate research degree, but expressed being constantly torn between the “clear career path” of industry and the unsure opportunities in academic research.

Other young science researchers believed that the private sector could offer good opportunities to science PhD graduates, but realised that the degree that they were studying for was not exactly what private industry was looking for. As one student said: “It’s not the PhD that will get me a job in industry. But if I am proactive in presenting myself to employers for jobs that I am interested in, there will be good opportunities around.”

University leaders (in particular deans of science faculties across Australia) and other science academics expressed anguish at the lack of recognition and the under-utilisation of skills that science PhD graduates possess – especially within the private sector. Their frustration at this situation in Australia is compounded by their knowledge that in other parts of the world this ambivalence toward higher research degrees simply does not exist.

As a result, universities are finding themselves in a precarious position in which they want to fulfil their charter to stimulate new, cutting-edge research that requires intense specialisation, but are pressured by the expectations of employers for graduates who are highly skilled in their field but also have a close knowledge of other fields of science, have excellent communication skills and are commercially savvy. Even when universities are successful in cramming all of this training into a 3-year research degree, they realise that there is no guarantee that suitable positions will be available in Australia for their graduates.

While the findings of this study suggest that the opportunities for science researchers in Australia are in general limited, the science field encompasses a wide range of disciplines, all of which have their own unique issues and experiences. The research undertaken for this study found that certain disciplines and skills had high employment demand due to substantial lack of supply within Australia.

In particular, research degree graduates from mathematical and statistical fields appear to be in short supply within the university sector. In part this is because the lure of attractive salaries in the financial sector has taken researchers with these skills out of the research workforce. However, there is also shortage in these areas as a result of the diminishing flow of students through the educational pipeline in these disciplines. As highlighted by many stakeholder groups, including the Australian Mathematical Sciences Institute, there has been a decline in uptake of science subjects in schools over the past decades, which leads to less interest from school-leavers in pursuing science degrees and a relatively smaller pool of potential PhD science students.

These findings, coupled with the other research undertaken in this project, reveals a number of things that can be done in Australia to

make the science research career more attractive and help retain young researchers in, and attract more experienced researchers to, Australia.

Of core importance in this regard is the promotion of stronger bonds and collaboration between private enterprise and university science faculties. There are numerous examples of successful collaborative efforts already well established in Australia, such as the Sustainable Minerals Institute at the University of Queensland and a number of highly successful Cooperative Research Centres within Australia. The details of a number of similar successful partnerships are contained within one of the reports resulting from this study.

More of these types of innovative practices are likely to help build an appreciation of the skills that a PhD degree can offer private industry and to help universities mould their postgraduate research programs to provide a balance of intensive specialised knowledge and the ability to adapt skills and expertise to a range of practices.

If such collaboration was to become more widespread and successful, the opportunities for graduates from PhDs in science in Australia would likely expand. Demand for this level of qualification within private enterprise may grow, leading to the opening of another clearer pathway for graduates to consider. In turn, if demand for graduates grows, the university sector will need to expand its teaching and research capacity in order to train new PhD graduates, suggesting possible future employment growth within the university sector.

Such notions may be overly optimistic and are more easily said than done, but they mirror the hopes and aspirations of many of those involved in the promotion and application of high-level research in the sciences in Australia.

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The four reports that were produced during this research project have been published by DEEWR and can be found at <http://www.workplace.gov.au/workplace/Publications/ScienceEngineeringandTechnologySkills-Publications.htm>