Building a research workforce is difficult. Among the main reasons why this is the case is the long lead-time in developing researchers. It can take 10 years for an academic researcher to become qualified and productively engaged. In doing so, prospective researchers typically negotiate a series of important steps, from undergraduate study through “cycle 2” qualifications to research higher degrees. Developed economies like Australia are fortunate in having substantial numbers of future researchers already ‘in the pipeline’ so to speak. The focus of this paper is on the role of research higher degrees in the ‘pipeline’ for building and sustaining a research workforce and enhancing its capacity.

Research degrees provide among other things the qualifications and experience that are the foundation for a career in research. Research higher degree candidates themselves play a central role in building and sustaining research and innovation capacity. Policy and practice around research higher degrees therefore plays a central role in building and sustaining innovation and research capacity. These efforts can be characterised as fulfilling three principal functions: attracting capable candidates to gain research qualifications and experience; retaining research students through to the successful completion of their degree; and graduating students with opportunities conducive to becoming established as an engaged and productive researcher.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Pathway</th>
<th>Function</th>
<th>Comparable RWS Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attract</td>
<td>Pathways in</td>
<td>To attract capable candidates to gain research qualifications and experience</td>
<td>Research Career Pathways</td>
</tr>
<tr>
<td>Retain</td>
<td>Student retention</td>
<td>To retain research candidates through to the successful completion of their degree</td>
<td>Supply of Researchers</td>
</tr>
<tr>
<td>Graduate</td>
<td>Pathways out</td>
<td>To graduate students with opportunities conducive to becoming an engaged and productive researcher</td>
<td>Employer Demand</td>
</tr>
</tbody>
</table>

These three broad dimensions reflect a pipeline effect inherent in building and sustaining innovation and research capacity. The following sections provide an overview of each of these dimensions, along with some of their implications for policy and practice.
Attracting students: Pathways and support

Among the principal functions of research higher degree policy and practice is to attract capable candidates to gain research qualifications and experience. Pathways and incentives combine to play a crucial role in ensuring adequate numbers of capable students progress to pursue research degrees.

Pathways

The 2010 National Research Student Survey allows valuable insights into research higher degree students in Australia, their views on research education and academic and research career pathways (Edwards, Bexley & Richardson, 2011).

Among findings were that 55% of candidates reported employment as their main activity in the year prior to commencing their research degree, with 20% reporting honours level study and 16% enrolled in coursework higher degrees (as reflected in Figure 1 below). Of students reporting employment in the year prior to commencing, 77% indicated that their work was related to their current degree (Edwards, Bexley & Richardson, 2011). The survey also found significant variation in patterns of prior activity by broad field of education, as reflected in Figure 2.1

Figure 1 Main activity prior to commencing research degree (all RHD students)

Q: What was your main activity in the year prior to commencing your research degree?

National Research Student Survey (unpublished data, Edwards, Bexley & Richardson, 2011)

1 Additional information on main activity in the year prior to commencing research degree for both international and domestic research students is included here as Appendix I.
As indicated in Figure 1, 16% of research candidates indicated participating in coursework postgraduate study in the year prior to commencing their research degree. Among other things, this suggests that the number of research candidates with prior coursework postgraduate qualifications is substantially higher than that, and these would in many cases have informed selection decisions for admission to the research degree, if not the principal basis for admission. Given the increasing prominence of coursework postgraduate qualifications, findings from the Postgraduate Survey of Student Engagement, or POSSE also represent a useful resource in providing insights into the various pathways to research degrees. In findings published in 2011, thirty nine percent of respondents ‘often’ or ‘very often’ consider continuing to a research degree, as reflected in Figure 3 below (Edwards, 2011, p.12).

Figure 3  Coursework postgraduates considering pursuing a research degree
Pathways and patterns in prior attainment are an important consideration in building and sustaining research capacity, and these issues are particularly salient when it comes to student selection and the award of scholarships. While the Australian honours degree remains the benchmark qualification for admission to research degrees, the issue of establishing the equivalence of other qualifications is drawing increasing attention, along with identifying evidence of research potential among other achievements and experience. Relevant factors here include the increasing prominence of coursework postgraduate education relative to honours degrees, and the challenge of identifying the most reliable predictors of research capability among what is often a very strong field of prospective international candidates. Given its prominence in admissions for research higher degrees, there are also opportunities to review the role, content and classification of honours degree programs, in the context of a broader review of research training.

**Incentives**

Recruitment and retention in research higher degrees are linked. This is because the things prospective candidates find attractive about a research destination are very often those that make research degrees look like a viable proposition. Chief among them are scholarships, stipend “top-ups”, infrastructure and support, reputation, activity and “critical mass,” and supervisory opportunities.

**Scholarships**

![Figure 4 Australian Postgraduate Award Rate as a proportion of the Poverty Line](image)

Scholarships are among the principal means of attracting prospective students and supporting them to undertake and complete research higher degrees. The Australian Postgraduate Award (APA) remains the benchmark living allowance stipend scheme for research higher degree scholarships in Australia. Provisions for the majority of scholarships provided by institutions are tied in one way or another to the APA conditions of award, and in many cases, this includes the APA stipend rate. The International Postgraduate Research Scholarships (IPRS) scheme continues to play an important role in supporting international students to undertake research degrees in Australia, with a recent review finding the program extremely effective and greatly valued in being able to support opportunities from among what is typically a very strong field of international candidates (DIISR, 2010).
In 2008 the Scholarships for a Competitive Future initiative provided for an increase in the number of Australian Postgraduate Awards (APA's) from 1,580 to 3,500, effectively doubling the number of scholarships offered between 2008 and 2012 (Palmer, 2010a). The 2009 Federal Budget in turn saw important reforms to the APA, including a 10% increase in the APA rate and improved annual indexation arrangements to help mitigate the ongoing erosion of the value of the award (Australian Government, 2009a, 2009b).

The increase in the APA rate of 10% announced in 2009 (effective for students in 2010) actually represented an 8% upward adjustment on top of an estimated annual increase of 2.1%. Annual increases in the rate are likely to increase by something in the order of 4% under the new indexation arrangements, which are due to take effect from 2012.² These improvements are certainly welcome, and the upward adjustment has meant that the APA rate has remained comfortably above the Poverty Line for a single individual through 2010.

Among 105 submissions to the 2008 House of Representatives Inquiry into Research Training and Research Workforce Issues in Australian Universities, 53 called for an increase in the annual rate of the Australian Postgraduate award to a level of at least $25,000, which at the time would have roughly constituted a 30% increase in the stipend rate for the award (Palmer, 2008). Had a 30% increase been announced in 2009, or the new indexation arrangements applied in the case of the APA stipend rate as of 2011 rather than 2012, then the current base rate for the stipend would now be comfortably above the Poverty Line for a single individual as derived by the Melbourne Institute of Applied Economic and Social Research. Based on the March Quarter indicators released in June 2011, the poverty line for a single individual now sits at $441.71 per week, while the weekly figure for the base rate of the APA is $439.62, which is just on 1% below the poverty line, as reflected in Figure 4 above (Melbourne Institute of Applied Economic and Social Research, 2011).

Figure 5 Weekly Australian Postgraduate Award Stipend Rate with the Poverty Line (with projections for 2012).

² The stipend rate for 2012 is due to be announced by October 2011.
Based on projections for 2012, the APA stipend rate looks likely to remain at or below the Poverty Line, despite the increases anticipated as a result of the application of new indexation arrangements to the calculation of the award rate (as reflected in Figure 5 above).

Other incentives
The important role played by additional scholarship support in supporting the participation of under-represented groups in research degrees was noted in the recently announced Research Workforce Strategy, which indicated the prospect of additional flexibility to ‘top-up’ scholarships from within APA grants (DIISR, 2011a, p.19). The question of the scope and flexibility of such a change, and the extent to which these may be constrained to specific priority areas, is yet to be determined. It is anticipated that such a change would allow opportunities for improved flexibility and ‘fit’ for both institutions and candidates, and potentially make a significant contribution to addressing the participation of under-represented groups in research education.

Resources and support
In 2010 the Council of Australian Postgraduate Associations (CAPA) released the report Minimum Resources for Postgraduate Study 2010, the result of a benchmarking exercise for the policies in place to help assure institution-wide minimum resource standards for postgraduate study. Publication of the report prompted significant interest in the issue of minimum resource standards for research higher degree students, and a number of institutions are in the process of reviewing their undertakings in this area. It is anticipated that CAPA may proceed with future iterations in benchmarking aspects of the research environment supported by universities. It is also likely that this will inform the development of research standards and quality benchmarks more broadly, along with other initiatives including investigations into the full cost of research training.

Reputation, activity and “critical mass”
Publication of the first full round of results from the Excellence in Research for Australia Initiative (ERA) has prompted significant attention from the media, university managers, nervous academics and university marketing departments. The extent to which these results will catch the attention of prospective research higher degree students, and how these results may align with other information presented on the proposed MyUniversity website, remains to be seen (Australian Government, 2011b).
Retaining students: Mitigating institutional and system attrition

Among the principal functions of research higher degrees policy and practice is to retain research candidates through to the successful completion of their degree. The interaction of support measures and efforts to mitigate student attrition plays a crucial role in ensuring adequate numbers of capable students not only pursue research degrees, but are able to successfully complete.

The high cost of student attrition in research higher degrees

Figure 6 Research students considering candidature variations by field of education

Research higher degrees are a high-stakes investment for research students. Domestic research students in Australia are fortunate in having access to subsidised places as part of the Federal Government’s Research Training Scheme (RTS) (DIISR, 2011b). However, the investment on the part of students includes not only time to completion and other income and opportunities forgone, but in an important sense also investments made on the part of the student in earlier phases of the ‘pipeline’, including those made in attaining prior qualifications. These, along with the public investment and investment on the part of institutions in each candidate mean attrition in research degrees is very costly indeed.

The link between retention and recruitment

Retention and recruitment are directly linked when it comes to research higher degrees. This is due largely to the fact that many of the characteristics of research destinations prospective candidates see as desirable are also enabling factors in student retention and completion. Scholarships are chief among these, along with other resources and support tailored to research students.

There is also a broader sense in which retention strategies are relevant to recruitment for research higher degrees, in light of the “pool” from which potential candidates may be drawn. A combination of both “cycle 1” (bachelor) and “cycle 2” (typically honours or coursework higher degrees) represent the typical prerequisites for admission to research degrees (and to the PhD in particular). Progression through cycle 2 qualifications is also a consideration where there is an anticipated shortfall of RHD graduates in particular disciplines, or in the under-representation in research education of particular groups. If adequate numbers are to be “recruitable” to research higher degrees, then attention needs to be paid to both participation and retention in prerequisite qualifications such as honours and coursework higher degrees. This is particularly the case for under-represented student groups.

**Unknown divergence in crude attrition**

Different forms of student attrition and retention are potentially distinguishable at all levels of study. Research students in particular actively use institutional transfers, enrolment status and variations to candidature in completing research degrees. Patterns are difficult to identify given the limitations of crude retention rates, the lack of reliable information on individual student progress over time and in recording aspects like elapsed candidature time (as opposed to calendar time). Nevertheless, given we know these factors play a major role, it is worth keeping in mind that retention, attrition and completion rates are complex matters in research higher degrees, and these occur at both the institutional and system level. An inverted “delta” or Nabla symbol (“\( \nabla \)”) is sometimes used in mathematical notation as shorthand for divergence. It seems appropriate then that comparable notation be used in seeking to account for unknown patterns of divergence in student attrition, such as compensatory factors in both institutional (\( \nabla_i \)) and system (\( \nabla_s \)) attrition.3

Further work needs to be done to inform our understanding of factors in retention and completion. This will no doubt be greatly assisted in the employment of a unique student identifier (comparable to a “CHESSN”) in informing patterns of student participation over time.

---

3 Addressed in greater detail in a forthcoming paper.

Opportunities through research degrees

Among the principal functions of research higher degrees policy and practice is to graduate students with opportunities conducive to becoming an engaged and productive researcher. Here quality, flexibility and ‘fit’ in degree programs combine with structured support programs to enable research graduates to prepare for, and make the most of, their professional opportunities on graduation.

Figure 7 Career aspirations of research students

Findings from the 2010 National Research Students Survey confirm that academic positions feature prominently in the career aspirations of research students (as reflected in Figure 7 above). Students also report that in their opinion research degrees prepare them well for some (but not all) aspects of academic work (Edwards, Bexley & Richardson, 2011).

In support of mobility and participation in research careers, the Australian Federal Government provides a range of structured support initiatives tailored to recent research graduates and early career researchers including ARC Discovery Early Career Researcher Awards (DECRAs) and a range of other fellowships and initiatives (DIISR, 2011b). Further opportunities exist for targeted support for research students at the point of completion, and for early career researchers 0-5 years out from PhD completion.
Developments in policy and practice

The Research Workforce Strategy announced by the Australian Federal Government notes evidence of variation (both across and within institutions) in the quality of the environments which research students experience and the standard of resources provided (DIISR, 2011a). A sensible response from a policy perspective would be to embrace a move toward the development and implementation of a set of agreed minimum standards for the conduct of research and research training.

In practice however there is a demonstrated propensity for university managers, academics and students to “over respond” to policy measures and incentives, particularly in the area of research and research training. The development and implementation of any policy-driven changes in this area should certainly be informed by this risk. Arguably many of the shortcomings identified in the development and implementation of the Research Training Scheme (RTS), and more recently the Excellence in Research for Australia Initiative (ERA), may be found not in the development and implementation of the programs themselves, but in the un-intended or ‘perverse’ ways academics, students and others have responded in engaging with them.

The development of standards for research training is currently under consideration by The Australian Federal Government, in the context of the development of a broader standards framework (Australian Government, 2011a; DIISR, 2011a, p.25). It has been proposed that in reviewing the standards and relevance of research training programs, these would take into account (among other things) the quality of the physical and intellectual environment and the integration of opportunities for skills development (DIISR, 2011a, p.25). the Government has proposed the development of clear standards for both the conduct of HDR training and qualification attainment, with the aim of strengthening the rigour and relevance of the research training system and implementing reforms that will lift the overall quality and breadth of the research training experience provided to students (DIISR, 2011a, pp.21-22).

On the one hand, development research standards as part of a standards framework may serve as an invaluable means of protecting against the reputational risk posed by poorly performing institutions, improving conditions for students, and arguably also improving the quality of outcomes (DIISR, 2011a, p.21). However, practices around research and research training are particularly sensitive to policy settings and system incentives, and there is significant danger of ‘breeding’ perverse incentives. Care should be taken to limit the compliance focus in standards frameworks to a narrow set of core minimum standards which are distinguishable from incentives for the development of enabling factors, ‘good practices’ and performance reporting opportunities. In such a way, minimum standards can be preserved and improved without compromising innovation in this area, including continuous improvement and quality enhancement efforts above and beyond what are described in the standards.

Fortunately, the transparent, consultative and evidence-based approach employed in the development of the Research Workforce Strategy by the Australian Federal Government Department of Industry, Innovation, Science and Research provides a firm basis for the development and implementation of standards in this area. Development of the RWS in fact should serve as a template for policy development of this kind. Prospects are good if the development of research standards is conducted in a similar manner.

Conclusion

In reviewing the role of research higher degrees in building and sustaining research capacity in the Australian context in 2011, the following salient conclusions may be drawn:

- In the context of graduate study, retention and recruitment are linked;
- Attention to student retention is an important consideration in minimising attrition both within and between each phase of the research training ‘pipeline’;
- To ensure adequate recruitment, retention and progression of capable students, each phase in the research training ‘pipeline’ needs to appear as a viable proposition from the perspective of students. Support measures, flexibility and ‘fit’ are all central in achieving this in all phases of the ‘pipeline,’ including opportunities on graduation;
- The Australian Postgraduate Award stipend rate requires an additional upward adjustment of at least 20% to remain as a competitive incentive for capable students to pursue research degrees, and to keep pace with the cost of living pressures of students; and
- Key drivers in research and research training are particularly sensitive to policy settings and system incentives, and there is significant danger of ‘breeding’ perverse incentives. Care should be taken to limit the compliance focus in standards frameworks to a narrow set of core minimum standards which are distinguishable from incentives for the development of enabling factors, ‘good practices’ and performance reporting opportunities.

References


DIISR (2011a). Research skills for an innovative future: A research workforce strategy to cover the decade to 2020 and beyond: Department of Innovation Industry Science and Research, Commonwealth of Australia.


Appendices

Appendix I  Prior activity for international and domestic research higher degree students

Figure 8  Main activity prior to commencing research degree (domestic only)

Q: What was your main activity in the year prior to commencing your research degree?  
(domestic research students only)

Figure 9  Main activity prior to commencing research degree (international only)

Q: What was your main activity in the year prior to commencing your research degree?  
(international research students only)

National Research Student Survey (unpublished data, Edwards, Bexley & Richardson, 2011)