

Securing Australia's Future – Research training system review

Submission by the Early- and Mid-Career Researcher Forum (EMCR Forum) of the Australian Academy of Science

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EXECUTIVE SUMMARY

Australia's Future is reliant on the quality of its research training in attaining, communicating, and translating research outcomes. The Research Training System should enable:

- (i) Critical thinking and project planning
- (ii) Effective communication across a range of stakeholders
- (iii) Growth into future research leaders
- (iv) Translation of an idea through the research and development cycle to a product

While a number of further attributes could be considered, communication, leadership, and research translation to complement core scientific expertise, are critical in securing Australia's future. It will ensure graduates are suitable for transition to non-academic workplaces and become future leaders in scientific and non-scientific arenas.

The Australian Academy of Science's Early- and Mid-Career Researcher Forum has the following recommendations.

Summary of Recommendations

1. Create access to opportunities for structured training in project design, planning, and management as part of each PhD program
 2. Provide training in communicating scientific ideas in an accessible manner as part of each PhD program
 3. Provide training in team leadership as part of each PhD program
 4. Educate innovators in the IP process and create streamlined processes for innovators to protect intellectual property
 5. Provide support for HDR candidates to undertake a research internship in an area outside the confines of their project
 6. Create a collection of case studies of varied exit pathways from the PhD
 7. Promote initiatives for gender equity in the research workforce
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INTRODUCTION

The 2015 review into the Research Training Scheme (RTS) commissioned by the Minister for Education and Training is very timely, as the skills and attributes research graduates possess are critical to securing Australia's future prosperity.

The review intends:

“to identify opportunities to improve Australia's research training system and deliver evidence-based findings to inform government policy.”

As the Early- and Mid-Career Researcher Forum (EMCR Forum) under the stewardship of the Australian Academy of Science, we pride ourselves on being the voice of over 3,000 early- and mid-career researchers across Australia.

The EMCR Forum's mission is to serve as the voice of Australia's early- and mid-career researchers, championing improvement in the national research environment through advocacy. We focus on sustainable and transparent career structures, gender equity, stable funding policies, career development opportunities, and raising awareness of issues science is facing.

In the context of our mission, research training is of vital importance. This enables graduates to seek and attain jobs outside academia, lending scientific skills to diverse professions, and tackling two critical issues facing Australian science and economy – the need to diversify job opportunities for researchers and the need to diversify a resource-dependent economy.

Our submission below draws on experiences of young researchers who have traversed the research training system in recent years, and closely interact with current research candidates. We recommend the following strategies and mechanisms to enhance research training.

We provide seven recommendations, which would fit within the various stages of a 3-4 year higher degree by research program.

ACRONYMS

EMCR	Early- and mid-career researcher (PhD candidates to ~15 years post-PhD)
HDR	Higher degrees by research
IP	Intellectual property
RTS	Research training scheme

THE EMCR FORUM'S DETAILED SUBMISSION AGAINST CONSULTATION QUESTIONS

Producing High Quality Researchers: Consultation Questions 1 to 3

1. What are the research skills and experiences needed to be an effective researcher?
2. What broader transferable qualities do HDR graduates need to develop to succeed in a wide range of career pathways? Should these skills be assessed, and if so, how?
3. What other broader capabilities should HDR graduates develop during their research training?

The EMCR Forum's Response to Consultation Questions 1 to 3

It is taken for granted that all good researchers have depth of knowledge in their scientific discipline. However, being an 'effective researcher' in the current environment requires a number of additional attributes to create an effective and complete researcher. These include:

- i. productivity-focussed project management,
- ii. internal and external communication skills,
- iii. leadership skills to build and grow teams, and
- iv. knowledge of research translation pathways.

Recommendations

1. **Create access to opportunities for structured training in project design, planning, and management as part of each PhD program.** The majority of higher degrees by research (HDR) candidates are passionate about their topic, however their effectiveness at tackling their research problem relies not only on their passion, but also their ability to effectively manage their time and resources. Without being mandatory, research training should offer HDR candidates opportunities to develop skills in project management. This is bound to produce outcome-focussed and productive research, while providing skills transferrable to any workplace.
2. **Provide training in communicating scientific ideas in an accessible manner as part of each PhD program.** In this era of information sound bites, such as 140-character Twitter posts and brief elevator pitches, the ability to convey scientific research in a concise and clear manner is critical.¹ Research candidates are closely involved in their topic and need to be trained to consider the big picture and convey their work in simple terms. Media training is a quick way to achieve this, but needs to be balanced to avoid over-hyped messages that may undermine science in the long-term. Training in distilling complex ideas into simple messages creates better communicators and advocates for science. This also helps researchers engage with industry, work with patent attorneys, while justifying the funding provided by the taxpayers for research and the research training scheme.
3. **Provide training in team leadership as part of each PhD program.** The ability to set a clear vision and inspire others defines science leaders. Such individuals also need to be able to communicate well within teams in giving and receiving feedback, and externally to articulate and team's goals and garner support.
4. **Educate innovators in the IP process and create streamlined processes for innovators to protect intellectual property.** Securing Australia's future relies on enabling innovators to protect, develop, and translate concepts into products. Researchers who have filed a patent have a dramatically increased chance of filing additional patents when compared to their contemporaries. Educational resources to assist researchers to understand IP law can assist in bringing larger segments of the Australian research community into the innovation cycle. This will make all HDR candidates aware of the process from conceptualisation to market, enabling greater research translation.

Contributing to Australia's Future Prosperity and Wellbeing: Consultation Questions 4 to 6

4. What skills and capabilities do employers in Australia need from HDR graduates?
5. What research skills and capabilities are needed to ensure Australia's research system remains internationally competitive?
6. What research skills and capabilities are needed from HDR graduates to ensure Australia is ready to meet current and future social, economic and environmental challenges?

The EMCR Forum's Response to Consultation Questions 4 to 6

Employers, especially outside academia, are often concerned about the level of training that needs to be offered to HDR candidates they employ. PhD-level graduates can be readily employed to lead research, development, or consultancy teams if the employers can rely on their training.

If research training encompasses **Recommendations 1 to 4** above, it would give employers much more confidence in employing HDR graduates.

Internships and research exchanges will enable professional development that will benefit both the HDR candidates and employers. Schemes such as the Australian Mathematical Sciences Institute (AMSI) internship program should be strongly supported.

Recommendations

5. **Provide support for HDR candidates to undertake a research internship in an area outside the confines of their project.** A major risk of HDR training is the tendency to become insular, with respect to discipline and geography. Creating opportunities for HDR candidates to experience multidisciplinary research and different approaches to research (a different research environment) are important. The former will prepare candidates for future needs, as most grand challenges require multidisciplinary partnerships. The latter will make graduates more internationally competitive.

Research Training System: Consultation Questions 7 to 10

7. What features of the research training system should be retained to ensure our graduates are internationally competitive?
8. How should the research training system be structured to produce high quality researchers who can contribute to Australia's future prosperity and wellbeing?
9. How can entry and exit pathways to and from research training be better structured?
10. How can barriers to participation in HDR programs be overcome so that more candidates from non-traditional backgrounds, including indigenous students, undertake research training?

The EMCR Forum's Response to Consultation Questions 7 to 10

The RTS functions well in producing high quality graduates, especially with respect to specialist knowledge.

Recommendations 1 to 4 above will add to the quality of the RTS and produce graduates with more diverse skills. This will ensure they can contribute to Australia's future prosperity and wellbeing (*Question 8*) while being adaptable to changing environments.

Barriers to participation in HDR programs, especially for candidates from non-traditional backgrounds, can be lowered by providing them with clear career options creating equitable workplaces. **Recommendation 7** below deals with gender equity, but this needs to expand to encompass all forms of diversity.

Recommendations

6. **Create a collection of case studies of varied exit pathways from the PhD.** Exit pathways from research training, and ensuring HDR candidate's awareness of these options, is very important. Supervisors of HDR candidates willingly and with best intentions provide suggestions based largely on their own experience, with this mainly being academia or research institutes. Giving graduates knowledge about varied opportunities in the form of additional examples and case studies is invaluable.
7. **Promote initiatives for gender equity in the research workforce.** Mechanisms to support young female researchers are critical in creating a well-trained workforce. HDR candidates (and potential candidates) need to see conscious efforts made to support and integrate them. If female EMCRs choose to start a family, lack of a supporting environment and challenges where career breaks are not effectively recognised by peers act as deterrents to remaining in research. Our platform of initiatives on 'Gender equity: current issues, best practice and new ideas' is available via the link below:³
<http://www.science.org.au/sites/default/files/user-content/genderequityemcrforum.pdf>

NOTES AND REFERENCES

1. A number of organisations are organising 'Three Minute Thesis' style competitions. This provides HDR candidates with an invaluable opportunity in trialling their communication skills. However, participants are left to their own devices. Providing training to all participants or the winners would be a good option.
 2. <http://amsiintern.org.au/> (Accessed: August 31, 2015)
 3. <http://www.science.org.au/sites/default/files/user-content/genderequityemcrforum.pdf> (Accessed: August 31, 2015)
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