Response to the Consultation Paper on

DEFINING QUALITY FOR RESEARCH TRAINING IN AUSTRALIA

A submission by

The Australian Academy of Technological Sciences and Engineering (ATSE)

to

Research Training Quality sub-group,
(Research Workforce Strategy Advisory Group)

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Australian Academy of Technological Sciences and Engineering

Response to Consultation Paper on

Defining Quality for Research Training in Australia

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The Australian Academy of Technological Sciences and Engineering (ATSE)[1] welcomes the opportunity to respond to the Consultation Paper on *Defining Quality for Research Training in Australia*.

Executive Summary

The Australian Academy of Technological Sciences and Engineering (ATSE)[1] welcomes the release of the Consultation Paper on *Defining Quality for Research Training in Australia* and is pleased to offer comment on the training of research students at Australia's universities, especially in the fields of engineering, applied science and the technologies.

ATSE supports the broad measures outlined that will see an improvement in the postgraduate experience. It cautions against a "one-size-fits-all" approach because of the different nature of research and its supervision in different disciplines. For applied disciplines it would recommend the possibility of a furlough in industry during candidature, use of industry co-supervisors, more flexible approaches to intellectual property ownership and inclusion of a highly focused coursework component.

Whilst ATSE is supportive of the Excellence in Research Australia approach as an institutional quality indicator, it believes that in applied fields of research the measurement of the uptake of outcomes of the research by industry is important and a partial determiner of the likelihood of a satisfying research student experience. ATSE would be pleased to provide further advice.

Introduction

ATSE is conscious of the significant changes taking place nationally and internationally in the conduct and application of public and private sector research. Internationally there are questions about the benefits of public sector research, with consideration of the "innovation

[1] The Australian Academy of Technological Sciences and Engineering (ATSE) is an independent body of 800 eminent Australian engineers and scientists driving technological solutions for a better Australia. ATSE was established in 1976 with the mission to promote the application of scientific and engineering knowledge to the future benefit of Australia. ATSE is one of four learned national Academies, which have complementary roles and work together both nationally and internationally. www.atse.org.au

dividend" that flows from such research. Countries wish to avoid the "Swedish paradox" in which a large investment in university and public sector research fails to deliver a proportionate increase in the productivity of the country. Accordingly, public sector researchers are increasingly being asked to demonstrate and foster the impact of their research. Within the private sector, companies are now focused on distributed research models ("open innovation") where inter-company cooperation is encouraged, as is the involvement of researchers in the public sector. Tomorrow's research graduates need to be trained to accommodate to these new environments and to be comfortable with teamwork and inter-disciplinary research. This should be an important consideration in assessing the quality of research training in the technological areas.

ATSE is equally conscious of the very different nature of customary research training in the technological disciplines compared with the arts and the humanities. In the former the accent is frequently on the researcher in training joining a research team under the leadership of an accomplished researcher. Published output from the group is frequently multi-authored and the challenge in assessing the PhD candidate is one of assessing his/her contribution to the team effort. By contrast, the humanities candidate often focuses on a research problem and expects the supervisor to provide guidance on approach, but not to be a co-author of any published output. The dynamics of supervision in the two cases can be markedly different. There is a significant challenge in attempting to develop uniform guidelines for supervision in these two very different situations.

ATSE sees the present exercise as one in which a re-look at the quality and approach to research training can be used to address Australia's acknowledged weaknesses in terms of industry-university collaboration and innovation-led productivity improvement. By encouraging training institutions to consider furloughs in industry as a part of research training, opportunities for industry researchers to co-supervise research students in appropriate areas and more flexible approaches to intellectual property ownership and scholarship top-ups, the links between universities and industry could be markedly improved to mutual benefit. The prospects of a research graduate securing a rewarding position in industry would be improved. These and other matters have been explored by ATSE in several recent workshops[2].

ATSE responses to the questions posed in the Consultation Paper:

[2] ATSE (2011) *Strengthening Links Between Industry and Public Sector Research Organizations – International Workshop Communique* http://www.atse.org.au/resource-centre/func-startdown/451/
ATSE (2011) *Increasing the Innovation Dividend from Emerging Technologies – Workshop Communique* http://www.atse.org.au/resource-centre/func-startdown/467/

1) **Should there be national minimum quality requirements for higher degrees by research? Should an institution only be eligible for funding schemes in fields where it meets minimum requirements?**

ATSE supports the view that an institution should only be eligible for support for research training funding schemes in fields where it meets the minimum requirements. These requirements should focus primarily on the provision of mechanisms to support the candidature of research students and the availability of experienced supervisors with a research reputation. Depending on the disciplinary area, there may be a case for requiring a critical mass of researchers and research students so as to provide the student with the opportunity of interaction with his/her peers.

2) **Should institutions be required to provide a minimum standard of physical resources in order to receive Research Training Scheme funding? (page 16)**

ATSE supports this requirement. However, it notes that aspects of the requirement could be met by giving the research student access to special infrastructure in industry or at other public sector research laboratories with firm agreements being put in place to secure such access. As a minimum students should have an identified location on campus where they can work and, for preference, interact with other research students.

3) **Should universities providing research training be required to ensure that students have sufficient access to opportunities such as conference attendance and international study**

ATSE supports this requirement but would equally see it as desirable that research students in appropriate disciplines spend a furlough in industry as part of their candidature. This period, for preference, would see them addressing an industry problem closely related to their research field of expertise and provide a basis for future collaboration as well as giving the industry sector exposure to academic research thinking. In addition, opportunities allow industry researchers to co-supervise research degree students in appropriate areas should be actively expanded.

ATSE cautions that ensuring research student attendance at national or international conferences could prove to be a significant cost burden on universities, provision for which may have to be made in funding allocations. Regarding international study, the existence of appropriate exchange agreements with overseas universities could be explored as a factor in assessing the competence of an institution to support research training in a particular field. It is obviously desirable to provide research students with the opportunity to broaden their experience but this should not come at the cost of a less intense focus on the research.

4) **What is the best way of ensuring that PhD supervisors provide high quality support to students? Should requirements be nationally consistent?**

Given that protocols exist for good research student supervision, these need to be widely promulgated and promoted. Nevertheless, it is difficult to see how nationally consistent

requirements across a range of disciplines could be established. However, national meetings of Deans in the various disciplinary areas could develop best practice guidelines. The application of these guidelines could be examined at the institutional level during future TEQSA assessments. By making the results of such assessments publicly available, students could be encouraged to seek out research groups that provide quality support. Unlike competitor countries, Australian research students are less willing to relocate for research training and the long-term effects of this phenomenon need to be explored and possibly overcome.
There are good examples in the CRC program of the provision of high quality support to research students.

5) **Given that positive Excellence in Research for Australia (ERA) results provide evidence of a quality research training environment at an institution, should an institution be able to provide alternative evidence of a quality research environment when positive ERA results are absent (for example in an emerging area of research). If so what alternative evidence should be provided?**

ERA provides evidence of the quality of published research output from an institution. It does not necessarily provide evidence of whether the research will yield an innovation dividend. The ability to innovate is an important factor in the training of researchers in the applied fields who see their future in other than academic institutions. For various reasons the engineering disciplines nationally have fared rather more poorly than their science counterparts in the recently completed ERA survey, yet numerous of their researchers are well respected by industry, undertake collaboration and contribute to national productivity. To use ERA as the primary determiner of funding for research training would seem to be unwise. Allowing institutions to put a case for collaborative research activity in areas of national importance would seem sensible in the absence of a complementary program (e.g. Excellence in Innovation Australia) that explores how research outputs are used.

6) **If an institution is unable to provide robust evidence of a quality research environment, should it be able to submit evidence of arrangements, such as partnering arrangements with another institution, that effectively compensate for its inability to provide a quality research environment without such arrangements?**

Many research students working in the applied fields are supported or have their stipends topped-up by collaborative funding mechanisms such industry grants, CRCs and ARC Linkage Grants. The award of such grants automatically signals a high level of collaboration which customarily ensures that the research student will have access to the resources of multiple organisations. Funds to support such students under schemes such as the refurbished RTS should be automatic, given that CAPA has already established that almost all Australian universities have protocols for good research student supervision in place.

It would seem unfortunate if the reorganisation of support for research training were to lead to greater concentration of research training activity in the Go8, thus denying emergent universities the opportunity of building up strong research groups in particular disciplines. The history of university development in overseas countries frequently rests on the employment of

promising researchers by emergent universities and the subsequent recruitment of these researchers by well established institutions. In the meantime research students working with these researchers have the opportunity of close interaction with quality research leadership at perhaps the most dynamic period of the supervisor's life.

Evidence of collaborative research linkages and access to appropriate infrastructure would seem a *sine qua non* of a research group's ability to provide an appropriate research training environment. Such collaborative agreements could equally well encompass industry, government, or a public sector research organisation as well as another university.

Here it is noted that the Commonwealth through the National Collaborative Research Infrastructure Strategy (NCRIS) and the National Research Infrastructure Council (NRIC) has established beach-heads of world-class research infrastructure. Institutions that are partners in NCRIS capabilities have the opportunity to offer research students in appropriate fields access to this equipment and environments where first class research can be undertaken. The availability of access to NRIC facilities should play a key role in the assessment of an institution's fitness to conduct research training in those research areas covered by NRIC.

7) Should government do more to enable research training in multidisciplinary environments? What barriers are there and how might they be overcome?

Clearly it is nationally desirable to foster multidisciplinary research. To some extent this occurs by the emergence of new research areas that draw on multidisciplinary teams. It is probably not helped by the natural conservatism of Australian Research Council panels, and assessments like ERA that tend to examine performance in traditional disciplinary clusters. Encouraging collaboration across disciplinary barriers can be fostered by requiring institutions in the award of APAs to demonstrate that they have given priority to interdisciplinary activities in a percentage (say 20%) of their awards.

Institutions active in research training could be asked to annually report the activities that foster inter-disciplinary capabilities in their research students. Examples could include the percentage of research students completing training programs in cognate disciplines, the emergence of new interdisciplinary research centres, engagement in interdisciplinary research via such organisations as CRCs and the appointment of academic staff that span conventional disciplinary boundaries.

8) Should Australian higher degrees by research include broader skills training? If so, should this be through compulsory coursework or through some other mechanism?

In the past in Australia the supervisor has had responsibility for ensuring that the research student under his/her care has developed broader skills during their research program. In some cases this has worked well; in others poorly. It is a derivative of the British system where the primary emphasis is placed on the quality of the final thesis and its originality. By contrast, in the American system students are required to complete a set amount of coursework before

they commence their research studies. US PhDs appear to do less intense research during the research-only period of their candidature (fewer publications are produced) and the tenure of the overall program is longer.

ATSE believes it would be desirable for research programs in the applied disciplines to carry the requirement to complete a limited number of courses to bring the research graduate up to speed with research methodology, information technology, communication, ethics, innovation and commercialisation and management. The time allocated to these should amount to no more than, say, 20% of the time allocated to the research program. It may be desirable to also require research students to undertake one subject at an advanced level in an interdisciplinary area so as to promote breadth in the acquisition of new knowledge. Programs such as the one at the University of Queensland referred to in the Consultation Paper seem attractive. Their development should be left to individual institutions.

As for the proposition that Australia consider moving to the Bologna 3+2+3 system for research training where students complete a Masters degree as a entry qualification for a PhD program, ATSE is ambivalent. It notes that many excellent engineers and applied scientists have been produced under the current four-year Pass and Honours programs offered by many institutions and that the requirement of research entrants to have first class honours or a very good second class honours degree has served Australia quite well. The danger of a 3+2 requirement for professional practice is that it may exclude excellent students on economic grounds. Perhaps a period of allowing Australia to follow a dual system should be contemplated before a decision is made on a possible overall change to a Bologna model.

9) Should the rules associated with Australian Postgraduate Award scholarships be amended or increased in flexibility? If so, in what ways?

It would seem desirable to increase the candidature of APAs to bring it in line with the period of candidature allowed under the RTS. This is especially so if the addition of modest coursework to current programs is contemplated. Flexibility to convert to part-time candidature and to allow employment in industry seems less desirable as such students are likely to be paid a graduate wage on entering industry and they no longer need to hold an APA. Completing a PhD whilst employed is not altogether undesirable, providing that the candidate continues to make good progress and completion statistics should allow for this.

10) What is the role of the research masters degree in the Australian research training system? Is its decline a cause for concern? (page 22)

ATSE does not view the decline in the candidature of the Masters degree as a cause for alarm. In the applied disciplines it is used primarily as an entry qualification for the PhD. For graduates seeking to update their skills in a narrow area of the profession, Coursework Masters programs have proved popular and effective.

11) Given the trend towards more diverse entry pathways for higher degree by research, how prescriptive should overlying principles be? How should institutional arrangements for student selection and admission be measured?

Successive Australian governments have refined the institutional funding mechanism for research students so that institutions are encouraged to ensure that candidates do not unnecessarily extend their candidature. This does not appear to have been at the cost of quality, as the output of published work bearing graduate names has not declined. Institutions build their reputation on the robustness or otherwise of their entry requirements and the quality of the research program they offer. There is not a case for being overly prescriptive, provided that periods of candidature and measurements of research output are maintained and made publicly available. Given that institutions can recruit new academic staff to improve their apparent ERA performance, measurement of the research output bearing research students names is probably a better measure of the research culture of the institution than assessing the output of staff members alone.

Institutional arrangements for student selection and admission can probably best be assessed using output measures such as rate and duration of completions.

Contact details

For further details on this submission and ATSE, please visit the ATSE website at www.atse.org.au.