

Post-implementation review (PIR): Joint Research Engagement (JRE) Engineering Cadetships

Purpose

The review is designed to evaluate the Joint Research Engagement (JRE) Engineering Cadetships scheme and provide evidence for future policy decisions and program design. This includes whether to continue the scheme in 2015 (and beyond) and, if so, under what policy and funding arrangements.

Background

The Joint Research Engagement (JRE) Engineering Cadetships scheme was announced on 9 December 2011.¹ The engineering cadetships scheme was the first of three program initiatives under a \$236 million (over five years from 2012-13) *Industrial Transformation Research Program*.² The three initiatives were promoted as:

More than 1,000 engineering cadetships over the next four years so students can get the work experience they need to kick-start their careers in manufacturing and other Australian industries.

New research training centres that will provide quality industrial doctoral and postdoctoral training for up to 600 PhD students each year.

New research hubs bringing researchers and industry representatives together to design and engineer commercially and technically viable solutions to some of our most pressing industrial problems.

The research training centres and research hubs are managed by the Australian Research Council, while engineering cadetships are managed by the Department of Education.

The policy proposal for Engineering Cadetships saw it as an opportunity for businesses who weren't ready to act as training centres but who still wanted to engage with universities and research students.

It was decided that funds for Engineering Cadetships would be redirected from the Joint Research Engagement scheme. JRE was an existing research block grant to universities with the objective (under the *Other Grants Guidelines (Research) 2012*³) of rewarding 'end-user research by encouraging and supporting collaborative research activities between universities, industry and end-users'.

The scheme was introduced on [16 February 2012](#)⁴:

¹ Media release, '\$249 million for university-business R&D partnerships', Prime Minister, Minister for Innovation, Industry, Science & Research, 9 December 2011.

² See http://www.arc.gov.au/ncgp/itrp/itrp_default.htm

³ Higher Education Support Act 2003 - Other Grants Guidelines (Research) 2012 (DIISRTE) - F2012L02010.

⁴ Media release, 'University funding boost will create a smarter and stronger Australia',

The Joint Research Engagement (JRE) - Engineering Cadetships will encourage cadets studying in the engineering or science disciplines to undertake a combination of formal research training in the form of a PhD or research Masters at a university and R&D activities within a firm...The JRE - Engineering Cadetships (\$1.32 million), a new initiative from 2012, supplements the research training costs of higher degree by research students undertaking a cadetship in areas of engineering or science.

Eligibility

Initially, participating universities received \$5,000 per student to supplement the research training costs of each student assigned an engineering cadetship. According to the Conditions of Grant⁵, an engineering cadetship may be offered to a student who is:

- funded under the Research Training Scheme (RTS) and
- combining their higher degree by research (research masters or doctorate) studies in science or engineering with employment in a business registered under the R&D Tax Incentive Scheme.

There are no restrictions on the minimum or maximum hours of employment, but the cadet must be an employee of the host business. An engineering cadet is eligible to receive an Australian Postgraduate Award scholarship during the term of their Cadetship.

Funding

The total places, value of cadetship and funding allocated to the engineering cadetships scheme is as follows:

2012-15 JRE Engineering Cadetship places, value of cadetship and allocated funding

	2012	2013	2014	2015
Total places funded (n)	265	530	795	1,060
Cadetship Supplementation Amount (including indexation) (\$)	5,000	5,195	5,351	5,447
Total (\$)	1,325,000	2,582,954	3,387,888	4,907,747

The budget provides for a gradual increase in funding as students in their first year move into second, third and fourth years.

In 2012, 73 per cent of the \$1.3 million budget was unused and rolled over. By mid-2014 the budget indicates a cumulative underspend of approximately \$6.3 million or 85 per cent of the budget.

Current status

The Engineering Cadetships scheme has now been operating for three years. Two funding rounds (2012 and 2013) have been completed and a third (2014) is underway.

In 2012 and 2013 six universities opted out of the scheme. In 2014 twelve universities opted out of the scheme.

In 2012 only a third (thirteen) of the 35 higher education providers who were eligible to offer cadetships successfully allocated cadetships. The others declined to participate or failed to take up their allocation. In 2013 only six universities allocated new cadetships and in 2014 (to date) only three universities have awarded cadetships.

Take-up of engineering cadetships is substantially below target. The program aimed to place 265 cadets in the first year, 530 after two years, and so on. In 2012 only 70 cadetships were awarded and in 2013 only a further 26 cadetships. In 2014 (to date) only nine new cadetships have been awarded (by three universities).

During each year a small number of cadets withdraw from the scheme and others complete their studies, leaving a corrected number of continuing cadetships.

As a result there are currently fewer than 100 cadets out of an expected 795—a fulfilment rate of less than ten per cent.

	2012	2013	2014 (to date)
Cadetship target numbers	265	265	265
Number of new cadetships	70	26	9
% of annual target achieved	27%	10%	4%
Cumulative cadetship target	265	530	795
Continuing cadetships (at end year)	59	70	62
% of target achieved	22%	13%	8%
Participating institutions	35	35	29
Institutions awarding new cadetships	13	6	3

A statistical summary of participating cadets is at **Attachment A**.

Issues

Implementation

The Joint Research Engagement Engineering Cadetships scheme was inspired by traditional industry internships. The idea was that businesses could identify a problem directly related to their business, then employ a cadet to work on that problem. The scheme would be linked to Australian Postgraduate Awards and the student would be 'taken in' by industry. The employer and the university would select the right student together so that research degree studies complemented employment in R&D and vice versa.

JRE engineering cadetships were initially pitched at firms, at least in theory. The approval documentation for the scheme stated that 'firms will engage cadets to undertake a combination of formal research training (PhD or Research Masters) at a university with

research and development (R&D) activities within the firm in relevant areas of engineering or science.’

However the decision to fund the scheme through research block grants (specifically, from a quarantined 1 per cent of the Joint Research Engagement scheme) meant that funding could flow only to higher education providers identified in Table A or B of the *Higher Education Support Act 2003*.

This meant that there was disconnect between the policy aspiration (which emphasised industry’s role in creating cadetships) and the constraints imposed by the way the scheme was funded (which meant that only universities could receive funding).

Incentives to participate

One of the scheme’s biggest challenges has arguably been the incentives for participation (or lack thereof). Starting at \$5,000 per student per year, the scheme was a ‘top-up’ of tuition costs rather than a whole or part-scholarship. Firms, who were expected to employ cadets, were not eligible to receive any funding at all.

In any case, the financial incentive appears to be too small to justify the effort by universities to find students to which they could award cadetships. The scheme is open to domestic students only, in limited fields of research, who are employees of businesses eligible for the R&D Tax Incentive. The funding could only be used to supplement ‘research training costs’ and could not be used in more marketable ways, for example by awarding fewer, more lucrative cadetships.

The university that stood to gain the most from the engineering cadetships scheme would, at best, have received cadetships funding equal to 0.2 per cent of its annual research block grant income.

	Benefits/incentives	Costs/disincentives
Universities	\$5,000 per student per year for ‘supplementing the research training costs’ of a cadet. This equates to around 0.2 per cent of research block grant funding per annum.	Administrative effort in identifying eligible students, paperwork, authorising transactions on the student’s behalf, reporting requirements. Little incentive to undertake the difficult and time consuming work of networking with industry to identify suitable research projects for students.
Students	Hard to determine. Some received financial benefit either directly or indirectly. Most cadets had an existing employment relationship so there was little additional industry experience.	Some administrative effort for what is, at best (to working engineers or scientists), a modest financial advantage. Use of the money tied to varying degrees depending on the university.
Firms	Unclear. If new employment relationship, the benefit from having a	If there is an existing employment relationship, nil additional work benefit and

<p>trainee researcher in the workplace. If no financial benefit. existing workers, the benefit from formally upskilling an employee and raising the qualifications profile of the firm.</p>

Scale and take-up

The scheme has had limited impact in terms of the numbers of students and employers signed up. Anecdotal evidence suggests that, even amongst university research office staff, awareness of the scheme's existence is low. This is at least partly due to the small scale of the scheme (the \$5 million in funding over four years is less than one per cent of the Joint Research Engagement scheme base grant) together with the absence of any budget for either promotion or administration.

As described in the summary, take-up of engineering cadetships has been below target. In 2012 almost two-thirds (22) of the 35 higher education providers who were eligible to offer cadetships declined to participate or failed to take up their allocation. In 2013 only six universities participated.

At this point in time there are currently fewer than 100 cadets out of an expected 795—a fulfilment rate of just 12 per cent. In 2012, 75 per cent of the \$1.3 million budget was unused and rolled over. 2013 budget figures will be available in October 2014.

There is very little evidence of 'additionality' in the cadetships that have been created. That is, consultation evidence suggests that, in most if not all cases, cadets were existing employees of firms and existing HDR students. Therefore, it is likely that very few *new* student-firm-university relationships have been formed through the scheme, despite the intention that 'firms will engage cadets'.

Stakeholder feedback

As part of their annual return, universities were invited to provide **comments** on the scheme. Overall, these were discouraging. While there is considerable interest within the sector in industry engagement in higher degrees by research, in practice many universities report that it is difficult to identify students eligible for these cadetships. As a result many universities declined to participate or advised that in its current form the scheme is 'overly restrictive', of 'insufficient value', and/or of 'limited benefit' to participants.

In 2014 the department conducted **surveys** of both eligible institutions and students who had formerly participated in the program to gauge uptake and satisfaction levels and to identify positive and negative views about the scheme. Two different surveys were prepared and administered, one directly by the department and one (for students) via Survey Monkey.

The institutional survey results (n=12 – maximum possible sample size, n=29) found the following:

- 80% of respondents said that participation did not improve their association with industry at all

- 67% of respondents said it was extremely difficult to find eligible students to participate
- 58% of respondents either did not participate or participated but could not achieve any uptake
- 50% of respondents thought that the scheme would be improved by not confining it to science and engineering - whereas the policy rationale for the scheme was to increase the exposure of precisely these students to industry.
- 58% of respondents wanted to open the scheme to international students, which again goes against the intent of the scheme
- Only 16% of respondents said that the scheme should continue in its current form.

The student survey response level was too small (n=5 – theoretical maximum possible sample size n=265, although actual scale of uptake will not be known until after 14 July) to have any statistical legitimacy. It is also unknown what the spread of the respondents was (that is, how many if any of the five students were from the same institution).

Post-implementation Review of JRE Engineering Cadetships - Attachment A

Statistical summary

Each year, universities were sent an Excel spread sheet to record information for all higher degree by research (HDR) students that participated in the program. Individual student data was entered in the 'Summary' worksheet and instructions for completion were provided in the 'Instructions' worksheet. The following information was collected for students: Student ID; Date of birth; Equivalent full time student load (EFTSL); Start date; Degree; Mode; Field of research; Employer; R&D activities.

Following is a statistical snapshot of cadets based on selected demographic and study characteristics.

Age: More than a third of cadets (36 per cent) were aged under 30 while a further quarter (23 per cent) were aged over 40. Around 40 per cent of cadets were aged in their thirties.

Degree: The vast majority of engineering cadets (86 per cent) were doing doctoral studies – a PhD. The remainder were studying Masters Degrees.

Field of research (two-digit level): At the two-digit Field of Research level, around two-thirds of engineering cadets were studying engineering and one-third were studying science.

Field of research (four-digit level): At the four-digit level, cadets whose Field of Research is engineering were most likely to be studying electrical and electronic engineering followed by chemical engineering. Next most common were civil, mechanical and maritime engineering.

Student load: More than two-thirds (69 per cent) of engineering cadets were studying a full-time or greater than full-time load (mostly 1.0 EFTSL) while also working for their host employer. The remaining one-third were studying part-time (mostly 0.50 EFTSL).

University cohort: Around two-thirds of cadets (65 per cent) were studying at Group of Eight (Go8) universities. Three unaligned universities accounted for around 20 per cent of cadets while one Australian Technology Network (ATN) university awarded 13 per cent of cadetships.

Employers: JRE engineering cadets were employed by a variety of large public enterprises, large private enterprises, small private businesses, cooperative research centres, other research institutes and university spin-off companies.