



THE UNIVERSITY OF
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Ranking Australian Universities: Controlling for Scope

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Rankings of universities that are based on aggregate measures ignore the discipline coverage within institutions. In this paper, for each of Australia's 37 public universities, performance in research and teaching in broad discipline groups is evaluated and then aggregated up to obtain whole-of-institution rankings. Relative staff numbers are used as weights to aggregate research performance; student numbers are used to weight teaching performance. The performance attributes chosen are those that contribute to international academic standing. The rankings of ANU and some technologically oriented universities are raised when scope is allowed for, but elsewhere the changes are minor.

1. Introduction

In Australia, the procedures for allocating both the Research Quantum Fund and the Learning & Teaching Performance Fund recognize that patterns of research and teaching vary across disciplines. National or international rankings of universities, however, typically use aggregate data that ignore the scope of research and teaching undertaken within an institution. While discipline rankings exist, they usually are not used as input into whole-of-institution rankings¹. Many rankings of universities are biased against institutions that have a heavy emphasis on the social sciences and humanities. For example, international rankings that use the aggregate number of journal articles listed in the Thomson Scientific (TS) data base are particularly influenced by whether or not a university has a clinical medical school².

* I am greatly indebted to Emayenesh Seyoum and Carol Smith for assistance with preparation of the data sets and to the Department of Education, Science and Training and the Graduate Careers Council of Australia for the provision of data.

¹ Information on the performance of universities is typically compiled either at the whole-of-institution level or at the discipline level. Examples of the former include the Shanghai Jiao Tao University (SJTU) world rankings, The THES-QS world rankings and various national rankings. World rankings at the discipline level are compiled by SJTU and THES-QS; US News and World Report in the USA and Maclean's in Canada provide national rankings of selected disciplines.

² See R. Williams, 'Broadening the Criteria: Lessons from the Australian Rankings', in Jan Sadlak and Liu Nian Cai (eds), *The World-Class University and Ranking: Aiming Beyond Status*, UNESCO-CEPES, 2007, pp. 205-221. Over the last 10 years in Australia, research in clinical medicine accounts for 22 per cent of articles and 37 per cent of citations in the TS Essential Science Indicators; only 11 per cent of academic staff in Australian universities are classified as being in Medical Studies.

One criterion for a good ranking methodology is that an institution that ranks highly in each of the disciplines that it covers should be ranked highly overall. In this paper we rank disciplines within an institution according to their performance in research, and in learning, training and teaching. The broad criterion used for choosing measures is ‘international academic standing’. Overall rankings are obtained by using a weighted average of the discipline rankings, where the weights reflect the scope of the institution. In research, the weights used are the relative number of academic staff in each discipline; in teaching, student numbers are used as weights. The research and teaching ratings are then combined to give institutional rankings.

All thirty-seven public universities that are members of Universities Australia are included: a full listing is given in the Data Appendix.

2. Measuring Scope

We define scope in terms of the distribution of academic staff across discipline areas. We use as the basic building block the official classification of academic staff by academic organizational unit (AOU) as compiled by the Department of Education, Science and Training (DEST). The ten discipline groups are

1. Sciences
2. Information Technology
3. Engineering
4. Architecture and Building
5. Agriculture/Environment
6. Health
7. Education
8. Management and Commerce
9. Society and Culture (includes Law, Economics and Behavioural Science)
10. Creative Arts

Data limitations sometimes require collapsing these groups into fewer classes. For some purposes it is useful to split the category Society and Culture into subgroups.

Staff numbers are calculated, in equivalent full-time units, as the sum of ‘teaching & research’ and ‘research only’ staff. Casual staff and staff holding ‘teaching only’ appointments are excluded. The percentages of staff in each university included in each category are given in Table 1. For the public universities in Australia as a whole, Science and Society & Culture each account for 20 per cent of academic staff; a further 16 per cent are employed in Health. Management & Commerce accounts for only 10.5 per cent of academic staff although 20 per cent of students are enrolled in this area.

The national averages hide major differences in discipline composition between universities. The proportion of academic staff in the area of Health ranges from a high of nearly 40 per cent at Flinders to negligible numbers at Canberra, Swinburne and USC.

Table 1: Scope of Institutions as Measured by Academic Staff Numbers, percentage shares, 2005

University	Science	IT	Engineering	Architecture & Building	Agriculture & Environment	Health	Education	Management & Commerce	Society & Culture	Creative Arts
ACU	7.4	0.0	0.0	0.0	0.0	19.8	34.8	12.0	25.9	0.0
Adelaide	29.6	2.3	9.2	1.3	11.0	19.8	0.7	5.0	18.8	2.4
ANU	37.3	2.0	2.8	0.0	4.4	5.1	0.2	6.3	36.4	5.6
Ballarat	8.7	11.8	3.9	0.0	0.0	25.8	12.4	19.3	12.6	5.6
Canberra	6.7	13.9	0.0	6.1	0.0	0.0	15.3	19.7	27.0	11.2
CDU	24.0	5.1	0.0	0.0	0.7	16.0	11.0	2.7	40.4	0.0
CQU	8.2	1.3	5.3	0.0	7.9	12.3	17.5	13.3	27.0	7.2
CSU	9.1	7.5	0.0	0.0	15.2	14.7	14.3	13.5	19.8	5.9
Curtin	15.4	5.4	12.9	0.0	2.6	18.6	1.4	14.9	22.2	6.6
Deakin	9.6	8.8	5.5	2.6	0.0	20.6	8.9	16.7	18.8	8.4
ECU	4.1	10.8	4.8	0.0	0.0	11.8	23.3	11.6	18.2	15.5
Flinders	10.7	5.2	0.0	0.0	0.0	39.4	6.9	4.1	33.7	0.0
Griffith	18.4	4.7	5.2	1.0	0.0	9.4	9.8	16.6	24.2	10.6
JCU	24.0	3.5	5.4	0.0	6.4	20.9	8.3	7.4	18.6	5.6
La Trobe	19.5	4.7	2.3	0.0	2.6	22.6	5.3	8.9	30.5	3.5
Macquarie	20.4	5.2	1.7	0.0	1.4	1.7	7.6	17.1	41.7	3.2
Melbourne	24.0	3.0	7.0	2.0	5.0	24.9	4.9	4.6	19.3	5.3
Monash	29.4	7.9	9.5	0.0	0.0	16.8	4.3	9.4	19.5	3.2
Murdoch	33.4	6.2	0.0	0.0	0.0	15.2	6.4	9.5	22.7	6.6
Newcastle	20.7	0.0	14.7	3.2	0.0	17.1	9.6	6.3	19.7	8.7
Queensland	28.2	0.0	13.7	1.9	5.9	21.2	1.7	5.8	18.9	2.6
QUT	16.9	10.6	4.7	6.3	0.0	11.5	12.3	12.1	17.0	8.6
RMIT	21.5	10.3	12.9	8.6	0.0	7.4	3.2	9.8	12.0	14.2
SCU	12.2	5.1	0.0	0.0	0.0	11.8	9.4	29.4	21.3	10.9
Swinburne	0.0	20.3	19.8	0.0	0.0	0.0	1.5	27.3	21.9	9.2
Sydney	22.1	2.3	5.7	1.8	2.0	29.8	3.4	6.5	21.8	4.5
Tasmania	17.2	5.1	2.6	1.9	8.5	17.3	7.9	6.0	27.3	6.2
UNE	12.9	5.7	0.0	0.0	12.1	4.9	17.6	5.1	36.0	5.7
UniSA	12.7	5.6	18.3	2.9	0.0	13.9	9.5	16.4	13.4	7.1
UNSW	22.3	5.4	16.9	3.5	0.2	11.0	1.0	12.5	22.5	4.8
USC	32.2	0.0	0.0	0.0	0.0	0.0	0.0	37.0	0.0	30.8
USQ	15.0	6.4	15.5	0.0	0.0	5.4	12.6	14.2	17.6	13.4
UTS	16.2	9.7	11.8	8.5	0.0	5.1	7.7	19.1	13.5	8.5
UWA	28.7	2.3	9.6	2.4	0.0	26.3	1.6	10.0	17.6	1.5
UWS	11.1	6.4	5.4	2.8	3.5	10.9	9.9	15.1	26.4	8.5
Victoria	4.3	12.3	12.8	0.0	0.0	13.4	6.0	15.4	30.7	5.1
Wollongong	19.6	9.9	17.8	0.0	0.0	3.8	7.2	11.0	25.7	5.1
Average	20.6	5.4	8.3	1.9	2.5	16.4	6.3	10.5	22.1	5.9

Macquarie has nearly twice the national average percentage of staff in Society & Culture; ACU has over one-third of staff in Education compared with a national average of only 6 per cent. Swinburne has 40 per cent of staff in either IT or Engineering compared with a national average of 14 per cent. CSU, UNE and Adelaide have over 10 per cent of staff in Agriculture compared with a national average of only 2.5 per cent. The proportion of academic staff in Management & Commerce ranges from 3 per cent (CDU) to 37 per cent (USC).

As an index of the overall degree of specialisation for each university we use the standard deviation of staff shares from the national average shares in each of the ten disciplines, standardised to give the most specialised university a score of 100.³ The ranking is given in Table 2.

On our criterion, USC is the most specialised university followed by Swinburne and ACU. The universities that are closest to the national average are JCU, Curtin and Monash.

With these differences among the discipline mix of Australian universities it is clearly desirable that performances measures take account of the scope of an institution. We now turn to measuring performance in the different discipline areas.

3. Measuring International Standing in Research

The research measures used are publications and citations in internationally recognized journals, total referred publications including books, success in national competitive grants, membership of academies and doctoral completions.

Publications and Citations

Publications and citations data are from the TS data banks ESI and USI (which collectively we will call ISI), for the most recent ten year period.⁴ USI data are used where either the ESI journal coverage is poor (Education and Arts & Humanities) or few Australian universities make the cut-off (Business & Economics). In total, seven discipline groups are distinguished. Four groups (Science, Information Technology, Engineering and Health) are constructed from the 20 ESI fields in these areas (see Data Appendix for details). There is some arbitrariness in dividing categories between Science and Health, but to combine them would fail to address the need to deal appropriately with institutions that do not have a clinical medical school. USI data are used for Education and for Economics & Business; a category Social Sciences & Humanities is constructed

³ A related absolute measure of specialisation is contained in R. Williams, 'Measuring submarket specialisation by firms', *Economic Letters*, 36 (1991), pp. 291-294.

⁴ Data from Essential Science Indicators relate to the period January 1997 to April 2007. University Statistical Indicators cover the period 1996-2005. In all the USI data the citations relate to two five year periods which are then added. I am indebted to Thomson Scientific for permission to use the USI data.

Table 2: Specialisation Index: Degree of Departure from National Staff Distribution Across Disciplines

Rank	University	Index
1	USC	100.0
2	Swinburne	76.3
3	ACU	70.0
4	Flinders	62.3
5	Canberra	59.9
6	ECU	56.2
7	ANU	55.0
8	UNE	54.7
9	Macquarie	54.4
10	SCU	48.8
11	CDU	47.8
12	Ballarat	46.3
13	Victoria	43.8
13	CSU	43.8
15	UTS	40.5
16	CQU	40.4
17	RMIT	39.0
18	USQ	38.3
19	UniSA	35.6
20	Wollongong	35.3
21	Adelaide	33.3
22	Murdoch	32.2
22	UWA	32.2
24	Deakin	31.2
25	Sydney	31.0
26	Queensland	30.2
27	UWS	28.5
28	QUT	27.4
29	La Trobe	26.0
30	Griffith	25.0
31	UNSW	24.9
32	Melbourne	24.6
33	Tasmania	23.5
34	Newcastle	22.6
35	Monash	22.0
36	Curtin	20.6
37	JCU	19.4

If university has same distribution of staff across disciplines as national average then index is zero. High values indicate greater departure from national average.

by combining ESI data in Social Sciences with USI data in Humanities.⁵

Corresponding staff numbers are obtained by re-grouping the 10 AOU's given above (see the Data Appendix).

ISI data cover publications which appear in journals. The data collected by DEST include journal articles, books, chapters in books, and referred conference papers. The coverage of journals is extended to all refereed publications. The wider coverage removes the quality filter given by ISI data, but in areas such as Law it compensates for deficiencies in the ISI coverage. A breakdown of DEST publications by discipline area is not readily available so only total weighted output over the five-year period 2001-2005 is used, with a weight of five for books.

Competitive Research Grants

The principle nationally competitive research grant schemes are those administered by the Australian Research Council (ARC) and the National Health and Medical Research Council (NHMRC). The measure used is the value of awards over the life of each project for successful applications in the years 2004-2006 (with funding normally starting in the next year). The ARC data cover both Discovery and Linkage projects and infrastructure funding. All NHMRC funding is included.

Under the definitions used, total funding to universities is similar under each scheme. It follows that unless allowance is made for the discipline composition of each university those universities with medical schools must dominate research funding, irrespective of the merits of other discipline areas. ARC funding is allocated to the 10 discipline groups using RFCDC codes as set out in the Data Appendix. NHMRC funding is all allocated to Health.

Federation Fellows

The ARC awards Federation Fellowships to distinguished scholars, typically for a period of five years. The data used are the number of fellowships awarded over the five years 2003-2007 for each university and by RFCDC code.

Academy Membership

It is difficult to allocate members of the four learned academies to the ten discipline groups. Instead, fellows of the Academy of Science and the Australian Academy of Technological Sciences and Engineering are allocated to a composite group defined for convenience as 'sciences' (the first six discipline groups set out in Section 2). Fellows of the Academy of Social Sciences in Australia and of the Australian Academy of the Humanities are allocated to a composite group labelled 'humanities and social sciences' (the last four in the list given in Section 2). Membership is at May 2007.

⁵ The Humanities data combine publications in the USI categories Classical Studies, History, Philosophy and Literature.

Doctoral Completions

The variable used is doctoral completions over the period 2002-2005 in each of the ten discipline areas listed in Section 2. A weighted aggregate is obtained using the distribution of academic staff across the disciplines.

4. Measuring Quality of Teaching and Research Training

The international standing of a university depends mainly but not solely on the standing of its academic staff and their research performance. Other attributes of a world class university include strong undergraduate and graduate programs that are reflected in measures such as student satisfaction, demand by students for places, and progression rates within the undergraduate degree and into graduate programs.

In choosing specific measures we use the information employed by DEST in allocating the Learning and Teaching Performance Fund. Three measures are taken from this source: overall student satisfaction with their course immediately after graduation,⁶ and progression rates and retention rates of Australian undergraduate students. The data are adjusted by DEST for characteristics of the institution and are provided separately for four discipline groupings:

- Science, Computing, Engineering, Architecture and Agriculture
- Business, Law and Economics
- Humanities, Arts and Education
- Health

We also employ this four discipline grouping in the calculation of weighted average (undergraduate) tertiary entrances scores (TES).

We construct rankings within each group and then aggregate up using as weights total student load in bachelors degrees in each category. (See the Data Appendix for load shares.) Total load is used as it is a better measure of scope than is domestic student load. The data are for 2005.⁷

The results of the 2006 Graduate Destination Survey (GDS), undertaken by the Graduate Careers Council of Australia, are used to calculate a measure of the propensity of students to proceed to research degrees (including honours) and masters by coursework in their own or another university. Progression rates to research degrees are calculated separately for 'science' and 'humanities and social sciences' using the same definitions as in research. Separate rankings are obtained and then combined using as weights the number of students graduating in each group in each institution. In obtaining a total ranking for

⁶ The data are from the Course Experience Questionnaire administered by all universities through the Graduate Careers Council of Australia.

⁷ For three universities (CDU, CQU and ECU) TES data were not available for 2005 so 2004 data are used.

this attribute, masters by coursework students are given a half-weight compared with research students.

The measure of student satisfaction we use at the graduate level is overall satisfaction with the PhD program taken from the postgraduate research experience questionnaire (PREQ) for the years 2004-2006. For many institutions the number of responses, even with three years data, is too small to permit disaggregation by discipline so we just use overall figures.

Finally, we calculate the resources available for learning and teaching as the sum of (i) Commonwealth Grants Scheme and other grants, (ii) Australian Government payments under HECS-HELP and FEE-HELP, (iii) upfront student contributions, (iv) fees and charges for teaching, (v) investment income and (iv) donations and bequests. This revenue estimate for 2005 is then divided by the onshore student load in teaching programs (i.e. excluding research higher degree students).⁸

5. Results

Research Performance

We have argued that in measuring research performance and standing there is a need to control for the composition of each institution. The data in Table 3 are measures of research performance that allow for compositional differences in staff numbers; data unadjusted for compositional differences are presented in Table 4. Ratings by individual disciplines groups are contained in Appendix Tables A1 to A5.

Using ISI publications and citations data (ESI and USI), the effect of weighting for scope is to increase the relative rating of newer institutions and institutions that do not have a long-established clinical medical school, that is, the rating for newer universities is a much higher percentage of the top rated institution when allowance is made for scope. ANU, where clinical medical education is relatively recent, is ranked about equal first with Sydney on ISI publications when allowance is made for scope, but using the raw data it is ranked fifth. Similar results are observed for citations data, where ANU moves from fourth to equal first after weighting for scope.

The rate of academy membership in a given university does not show marked differences across the two broad discipline groups (sciences and humanities/social sciences) so that weighting for scope makes little difference to overall rankings. ANU dominates.

The importance of NHMRC income is indicated in the findings for nationally competitive grants. ANU is equal first with Sydney when we allow for scope, but is sixth ranked on total income. In contrast, Melbourne is first ranked on total income but falls a little

⁸ The payment to the Australian National University for the (research) Institutes is excluded. The mix of disciplines and level of courses (including masters by coursework) makes it difficult to establish appropriate discipline weights, so only aggregate student numbers are used.

Table 3: Research Performance and Standing: Weighted by Scope

Rank	University	Publications		Citations	Academies	Grants	Fellowships	Doctoral Completions	Total
		ISI	DEST	ISI					
1	ANU	99.0	77.7	99.8	100.0	99.3	86.7	80.9	100.0
2	Melbourne	90.8	100.0	88.9	67.4	96.6	85.6	100.0	97.8
3	Sydney	100.0	96.3	100.0	49.9	100.0	74.7	98.8	97.1
4	Queensland	86.2	91.0	76.4	22.9	78.4	100.0	87.4	82.1
5	UNSW	85.8	80.8	84.0	29.8	86.8	43.7	78.3	77.9
6	Monash	69.2	86.5	59.4	27.2	58.1	29.0	75.4	65.1
7	UWA	51.2	48.8	48.3	24.0	43.4	17.2	45.8	45.0
8	Adelaide	40.3	46.8	33.3	21.0	36.1	17.8	43.9	38.4
9	QUT	34.1	34.5	31.2	1.8	33.9	4.3	31.3	28.2
10	Macquarie	19.7	28.5	15.5	12.4	21.6	17.4	38.7	24.2
11	La Trobe	25.6	29.6	22.9	19.3	12.9	2.4	32.7	24.0
12	Griffith	25.6	33.1	16.0	5.1	19.5	3.9	35.3	22.8
13	Newcastle	26.2	28.8	24.4	5.5	17.6	4.4	26.2	21.8
14	Wollongong	15.6	27.9	12.4	2.5	29.3	8.3	28.2	20.0
15	Tasmania	19.2	22.8	12.6	8.6	15.1	2.7	27.5	17.9
16	RMIT	2.9	28.8	1.7	0.9	22.4	12.9	43.9	17.8
16	UTS	14.1	24.5	13.3	4.4	24.5	3.4	24.2	17.8
18	UWS	16.2	24.9	14.4	3.4	15.7	0.0	23.6	16.4
19	Flinders	17.7	22.2	13.8	7.7	12.0	0.0	24.3	16.3
20	UniSA	13.2	25.3	9.9	1.9	16.2	0.0	30.1	16.1
21	Curtin	17.2	25.1	14.2	2.3	8.1	0.0	26.9	15.6
21	Deakin	16.1	28.6	13.6	1.4	10.9	4.3	21.0	15.6
23	UNE	17.2	14.6	11.0	6.8	8.9	0.0	24.2	13.8
24	ECU	14.9	17.6	12.4	1.0	3.3	0.0	18.6	11.3
25	Murdoch	9.4	14.8	6.6	3.9	7.4	0.0	21.1	10.5
26	JCU	10.5	15.3	10.0	2.5	4.9	6.5	15.8	10.4
27	Swinburne	0.7	13.3	0.4	1.8	19.6	0.0	19.8	9.3
28	CSU	8.0	14.1	5.3	0.8	4.0	0.0	11.2	7.2
29	SCU	1.2	6.2	0.7	0.5	1.5	0.0	32.6	7.1
30	ACU	6.8	6.9	2.3	1.6	4.9	0.0	14.8	6.2
31	Victoria	1.7	16.3	0.5	0.7	1.4	0.0	15.9	6.1
32	USQ	4.0	6.8	7.8	0.0	2.4	0.0	5.0	4.3
33	Canberra	2.5	7.8	0.5	0.0	3.3	0.0	10.0	4.0
34	CQU	3.6	9.4	2.6	0.0	1.0	0.0	4.0	3.5
35	Ballarat	1.3	5.4	1.0	0.7	1.5	0.0	4.8	2.4
35	CDU	1.1	4.3	0.6	0.3	3.7	0.0	4.4	2.4
37	USC	0.4	2.1	0.1	0.0	1.5	0.0	5.0	1.5

Table 4: Research Performance and Standing: Unweighted by Scope

Rank	University	Publications		Citations	Academies	Grants	Fellowships	Doctoral	Total
		ISI	DEST	ISI				Completions	
1	Melbourne	89.2	100.0	95.4	67.7	100.0	77.3	100.0	100.0
2	Sydney	100.0	96.3	100.0	49.7	95.6	95.5	90.9	98.2
3	Queensland	84.7	91.0	82.3	25.5	68.4	100.0	87.7	82.8
4	ANU	68.1	77.7	77.9	100.0	49.3	77.3	48.6	77.9
5	UNSW	71.6	80.8	67.0	29.7	59.2	45.5	73.3	68.4
6	Monash	61.1	86.5	61.7	28.4	65.9	36.4	68.9	66.1
7	UWA	51.8	48.8	50.9	24.2	45.9	22.7	48.0	47.5
8	Adelaide	39.6	46.8	36.7	20.0	36.7	18.2	36.4	38.1
9	La Trobe	13.3	29.6	10.5	18.7	8.3	4.5	27.6	18.7
10	Newcastle	17.9	28.8	14.8	5.5	17.7	4.5	23.0	18.6
11	Macquarie	12.1	28.5	11.3	11.0	9.7	18.2	21.2	17.4
12	QUT	12.1	34.5	6.3	1.6	12.3	4.5	25.7	16.0
13	Griffith	10.7	33.1	5.6	4.5	8.5	9.1	27.2	15.9
14	Tasmania	16.3	22.8	13.0	8.7	7.4	4.5	23.0	15.8
15	Wollongong	7.6	27.9	4.6	2.6	11.1	4.5	22.7	13.3
15	Curtin	8.7	25.1	5.8	2.3	7.0	0.0	29.8	13.3
17	Flinders	8.7	22.2	7.0	7.7	11.0	0.0	17.7	12.6
18	Deakin	6.3	28.6	3.6	1.3	5.5	4.5	19.7	11.4
19	RMIT	1.1	28.8	0.3	1.0	5.3	4.5	28.0	11.3
20	UniSA	4.5	25.3	1.9	1.9	9.7	0.0	20.5	10.8
21	JCU	10.5	15.3	9.4	2.3	4.3	9.1	14.5	10.3
22	UTS	3.2	24.5	0.8	4.2	7.4	4.5	17.3	10.1
23	UWS	2.7	24.9	0.8	2.6	3.6	0.0	17.7	8.8
24	Murdoch	5.9	14.8	4.2	3.9	5.6	0.0	17.1	8.7
25	UNE	6.4	14.6	3.4	5.8	2.2	0.0	16.5	8.3
26	Swinburne	0.1	13.3	0.0	2.3	4.6	0.0	11.9	5.4
27	ECU	1.4	17.6	0.4	0.6	1.3	0.0	9.2	5.2
28	Victoria	0.2	16.3	0.0	0.6	0.5	0.0	11.9	5.0
29	CSU	2.0	14.1	0.9	0.6	1.0	0.0	5.9	4.1
30	SCU	0.1	6.2	0.0	0.3	1.1	0.0	9.7	2.9
31	CQU	0.2	9.4	0.0	0.0	0.4	0.0	4.0	2.4
32	Canberra	0.2	7.8	0.0	0.0	1.4	0.0	4.2	2.3
33	ACU	0.2	6.9	0.0	1.0	0.6	0.0	3.7	2.1
33	USQ	0.3	6.8	0.1	0.0	0.5	0.0	4.4	2.1
35	CDU	1.0	4.3	1.0	0.3	1.7	0.0	3.6	2.0
36	Ballarat	0.1	5.4	0.0	0.6	0.9	0.0	3.8	1.8
37	USC	0.0	2.1	0.0	0.0	0.1	0.0	0.8	0.5

below Sydney and ANU when we allow for scope. Queensland has had the most number of Federation Fellows whether or not we allow for scope.

Melbourne is first for doctoral completions on either method of rating. As with publications, weighting by scope improves the relative ranking of newer institutions, especially those which are not science-oriented. Southern Cross, for example, increases from 10 per cent of the best performing institution (Melbourne) to 33 per cent after allowing for the distribution of staff within institutions.

The total columns in Tables 3 and 4 are obtained by a simple average of the seven attributes with a half-weight on Fellowships in recognition that these are a narrow measure of the ability to attract researchers⁹. Controlling for scope raises the scores for all non-GO8 universities and therefore reduces overall dispersion; the greatest increase in ranking occurs for UTS (6 places) and UWS (5 places)¹⁰.

On overall research performance, after allowing for scope, ANU is first ranked followed by Melbourne, Sydney and Queensland in that order. If scope is ignored Melbourne is first ranked followed by Sydney, Queensland and ANU in that order.

Teaching and Research Training

Performance measures in teaching and research training are given in Table 5. In obtaining the ratings for each measure of performance all data have been weighted by discipline mix except for student evaluation of PhD programs and resources per student.

The three variables taken from the Learning and Teaching Performance Fund data (undergraduate satisfaction, retention and progression rates) show much less dispersion across institutions than were observed with the research measures: the lowest ranked institution typically has a rating of about 75 per cent of the top ranked institution. In part this compression is due to the fact that the data are standardised by DEST to reflect institutional characteristics. G08 universities (ANU and Melbourne) occupy only two of the top ten places in student satisfaction; the top three are Murdoch, New England and Wollongong. The G08 universities do well in progression rates (six out the top ten); the top three universities are Canberra, UNSW and Melbourne. Melbourne has the best retention rate followed by ANU and Macquarie.

ANU dominates resource levels per student followed by UWA, Melbourne and Sydney. Melbourne has the highest quality intake as measured by the TES, followed by UWA.

Progression rates to higher degrees exhibit considerable variation. Given the mission of G08 universities it is not surprising that they occupy the top five positions: ANU is a clear first followed by Sydney and Adelaide. In contrast, students from G08 universities

⁹ Publications in quality journals are implicitly given a double weight as they enter in both ISI and DEST publications.

¹⁰ The largest fall occurs for Curtin owing to the low staff weight given to its good performance in Education. The result may be due to inappropriate classification of staff in the data.

Table 5: Teaching and Learning, Weighted by Scope

Rank	University	Student Satisfaction		Progression Rates		Retention	Entrance		Total
		undergrad	PhD	undergrad	to postgrad	Rates	Score	Resources	
1	ANU	96.2	86.7	98.4	100.0	98.8	96.8	100.0	100.0
2	Melbourne	92.6	85.3	99.3	66.0	100.0	100.0	77.8	91.7
3	UWA	91.5	84.5	97.9	66.1	94.1	98.9	84.7	91.3
4	Sydney	82.9	82.3	98.3	76.3	96.5	95.7	75.6	89.8
5	Adelaide	82.4	86.9	93.0	75.0	94.0	92.0	66.7	87.1
5	Macquarie	87.5	83.6	96.1	65.9	97.8	96.8	61.9	87.1
7	Queensland	86.6	89.3	96.8	51.6	92.1	95.6	71.5	86.2
8	Monash	89.6	88.2	95.3	53.5	95.3	91.1	68.4	85.9
9	UNSW	87.0	77.0	99.5	47.9	97.3	96.9	68.3	84.8
10	Wollongong	96.4	81.2	97.9	52.2	96.6	88.0	55.8	83.9
11	Tasmania	86.3	82.3	92.5	61.4	91.6	84.3	63.5	83.0
12	Murdoch	100.0	91.6	91.2	46.9	89.3	85.6	56.1	82.9
13	UTS	89.6	93.4	98.1	21.3	95.5	92.1	58.5	81.1
14	La Trobe	88.3	90.8	92.7	47.6	89.4	80.3	55.2	80.4
15	Newcastle	84.0	85.9	94.9	34.6	96.0	87.9	58.3	80.0
15	Curtin	87.2	84.6	94.1	25.7	94.8	91.1	63.8	80.0
17	Flinders	86.9	76.6	92.2	46.4	91.5	83.2	57.5	79.0
18	JCU	89.7	98.3	87.5	20.0	84.0	84.0	61.2	77.5
19	Griffith	86.8	79.0	91.8	41.7	83.2	86.1	55.5	77.4
19	Canberra	86.5	80.4	100.0	22.2	95.7	86.4	52.5	77.4
21	QUT	84.1	84.3	91.3	22.9	89.4	90.1	58.4	76.9
22	Swinburne	93.3	69.8	95.3	25.8	92.9	79.4	59.0	76.2
23	UniSA	84.7	77.5	92.1	25.5	91.8	78.7	63.0	75.8
24	UNE	97.6	89.3	89.0	21.1	90.2	74.2	49.8	75.5
25	RMIT	85.1	63.6	94.2	27.1	92.5	80.2	65.8	75.1
26	Victoria	90.8	84.2	88.0	25.8	88.6	73.8	55.5	74.8
27	SCU	93.7	100.0	91.4	15.0	82.3	69.7	51.1	74.3
28	USC	94.5	*	85.5	21.9	78.1	79.8	55.5	73.8
29	Deakin	87.1	56.0	93.0	32.9	92.8	79.3	58.3	73.8
29	ECU	86.4	83.3	91.0	19.2	87.3	79.5	52.7	73.8
31	ACU	88.6	*	96.4	12.4	91.7	79.6	45.1	73.6
32	Ballarat	94.4	*	90.7	22.4	91.0	73.0	41.7	73.5
33	CSU	90.9	*	90.7	8.5	92.4	74.4	47.2	72.2
34	USQ	93.6	77.4	85.8	16.3	86.1	85.1	44.0	72.1
35	UWS	80.4	86.5	93.2	19.8	86.9	71.0	49.4	72.0
36	CDU	68.0	82.4	82.2	11.2	81.3	77.4	67.8	69.5
37	CQU	75.6	67.0	79.9	15.4	89.5	83.7	54.0	68.7

* Denotes 10 or fewer observations, put equal to national average of 84.6 in calculating overall ranking.

are more critical of their experience: the top five positions on the student survey data are all non-G08 institutions: SCU, James Cook, UTS, Murdoch and La Trobe.

Overall satisfaction with PhD programs is highest for smaller universities, with SCU recording the highest level. The best performing GO8 university is Queensland, ranked number six.

The last column in Table 5 provides a measure of overall ranking in teaching and research training obtained by a simple average of the seven attributes. ANU is ranked first followed by Melbourne, UWA and Sydney.

Overall Performance

The results for research and teaching (the last columns of Tables 3 and 5) are now combined using equal weights for each. These weights are based on the findings of our earlier survey of university CEOs¹¹. Two sets of results are given in Table 6: one where research is weighted by scope and one where it is not.

If allowance is made for scope, the highest ranked institutions are ANU, Melbourne, Sydney, Queensland, UNSW and Monash in that order. If no adjustment is made for scope ANU falls to third but the other orderings are maintained. Apart from ANU, the biggest improver in ratings when allowance is made for scope is QUT; UWS and UTS also show a small improvement. On the other hand, the rankings of the most specialised institutions as listed in Table 2 are not much changed by adjusting for scope.

6. Concluding Remarks

There exist marked differences in the scope of Australian universities as measured by the distribution of academic staff across disciplines; one important differentiating factor is whether or not the institution has a medical school. In principle, universities should be evaluated on the basis of whether they are good at what they do. This implies that institutional performance should be defined as a weighted sum of discipline performance. We have followed this approach, and while allowing for scope does reduce the dispersion in the *rating* scores, for only a few universities does it significantly affect institutional *rankings* in Australia using as the criterion 'international academic standing'.

At the top end of the rankings, allowance for scope moves ANU to first place but the ordering of the other GO8 universities remains unchanged. The result is not surprising given that the ANU medical school is relatively new and the staff profiles of the seven state based GO8 universities are similar.

The rankings of the more technologically oriented universities, such as QUT, are improved when controlled for scope.

¹¹ See R. Williams and N. Van Dyke, 'Measuring the International Standing of Universities with an Application to Australian Universities', *Higher Education*, 53 (June 2007), pp.819-841.

Table 6: Index of the International Standing of Australian Public Universities

<i>Allowing for Scope</i>			<i>Research Unadjusted for Scope</i>		
Rank	University	Index	Rank	University	Index
1	ANU	100	1	Melbourne	100
2	Melbourne	95	2	Sydney	98
3	Sydney	93	3	ANU	93
4	Queensland	84	4	Queensland	88
5	UNSW	81	5	UNSW	80
6	Monash	75	6	Monash	79
7	UWA	68	7	UWA	72
8	Adelaide	63	8	Adelaide	65
9	Macquarie	56	9	Macquarie	55
10	QUT	53	10	La Trobe	52
11	La Trobe	52	10	Tasmania	52
11	Wollongong	52	12	Newcastle	51
13	Newcastle	51	12	Wollongong	51
14	Tasmania	50	14	Griffith	49
14	Griffith	50	14	Curtin	49
16	UTS	49	16	QUT	48
17	Curtin	48	16	Murdoch	48
17	Flinders	48	16	Flinders	48
19	Murdoch	47	16	UTS	48
20	RMIT	46	20	JCU	46
20	UniSA	46	21	UniSA	45
22	Deakin	45	21	RMIT	45
22	UNE	45	23	Deakin	44
24	UWS	44	23	UNE	44
24	JCU	44	25	Swinburne	43
26	Swinburne	43	26	UWS	42
27	SCU	41	26	Victoria	42
27	Canberra	41	26	Canberra	42
29	Victoria	40	29	SCU	40
29	ACU	40	29	CSU	40
29	CSU	40	31	ACU	39
32	USQ	38	31	Ballarat	39
32	Ballarat	38	31	USC	39
32	USC	38	31	USQ	39
35	ECU	37	35	ECU	35
36	CDU	30	36	CDU	31
36	CQU	30	36	CQU	31

The ratings of the more specialised universities are not greatly affected when scope is allowed for. This finding reflects the fact that Australia does not possess outstanding specialist institutions, such as the London School of Economics, the Swiss Federal Institute of Science, and the Indian Institute of Science.

It remains an open question as to whether controlling for scope would change institutional rankings more if we used a finer discipline breakdown or could obtain better data on research output in the social sciences and humanities.

Data Appendix

1. Mapping of 21 ESI categories into discipline groups

- Engineering = Engineering + ½ Material Science
- Information Technology = Computer Science
- Science = Agric Science + ½ Biology & Biochemistry + Chemistry + Environmental/Ecology + Geosciences + ½ Materials Science + Mathematics + ½ Molecular Biology & Genetics + ½ Multidisciplinary + Physics + Plant & Animal Science + Space Science
- Health = ½ Biology & Biochemistry + Clinical Medicine + Immunology + Microbiology + ½ Molecular Biology & Genetics + ½ Multidisciplinary + Neuroscience & Behaviour + Pharmacology & Toxicology + Psychiatry/Psychology
- Social Sciences = Social Science General

2. USI mapping

- Arts&Humanities = History + Philosophy + Literature + Classical Studies

3. Mapping of Academic Staff in 10 AOU's into ISI-based discipline groups:

- Science = Science + Agricultural Science + Architecture & Building
- Information Technology = Information Technology
- Engineering = Engineering
- Health = Health + Behavioural Science
- Education = Education
- Economics & Business = Management & Commerce + Economics
- Social Sciences & Humanities = Society&Culture + Creative Arts – Economics – Behavioural Science

4. Mapping of RFCD codes into the 10 AOU's

Science = Mathematical Sciences + Physical Sciences + Chemical Sciences + Earth Sciences + Biological Sciences

Information Technology = Information, Computing and Communication Sciences

Engineering = Engineering and Technology

Agriculture = Agricultural, Veterinary and Environmental Sciences

Architecture & Building = Architecture, Urban Environment and Building

Health = Medical and Health Sciences

Education = Education

Management & Commerce = Commerce, Management, Tourism and Services

Society & Culture = Economics + Policy & Political Science + Studies in Human Society + Behavioural & Cognitive Sciences + Law, Justice & Law Enforcement + Journalism, Librarianship & Curatorial Studies + Language & Culture + History & Archaeology + Philosophy & Religion

Creative Arts = The Arts

Data Sources

Staff and Student Numbers: Department of Education, Science and Technology (DEST)

Publications and Citations: Thomson Scientific (TS) Essential Science Indicators (ESI) and University Statistical Indicators (USI); DEST data at <http://www.universitiesaustralia.edu.au/content.asp?page=/publications/stats/research.htm>

ARC Research Grants: http://www.arc.gov.au/general/searchable_data.htm

NHMRC Research Grants: <http://www.nhmrc.gov.au/funding/dataset/rmis/index.htm>

Federation Fellows: http://www.arc.gov.au/ncgp/fedfellows/ff_outcomes.htm

Academy Membership: Australian Academy of the Humanities (www.humanities.org.au), Australian Academy of Science (www.science.org.au), Academy of Social Sciences in Australia (www.assa.edu.au), and Australian Academy of Technological Sciences and Engineering (www.atse.org.au)

Doctoral Completions: DEST

Course Experience Questionnaire Responses, Progression Rates and Retention Rates http://www.dest.gov.au/sectors/higher_education/policy_issues_reviews/key_issues/learning_teaching/ltpf/2007ltpf.htm

Tertiary Entrance Scores (TES): DEST

Movement to Higher Degrees: Graduate Destinations Survey, Graduate Careers Council of Australia

Satisfaction with PhD program: Postgraduate Research Experience Questionnaire, Graduate Careers Council of Australia

University Revenue:

http://www.dest.gov.au/sectors/higher_education/publications_resources/profiles/finance_2005_stats.htm

Undergraduate Student Load, percentage shares, 2005, LTPF categories

University	Sciences	Business	Humanities	Health
ACU	3.7	13.5	51.9	30.8
Adelaide	40.9	26.6	18.7	13.8
ANU	24.0	28.7	44.9	2.4
Ballarat	19.8	30.6	31.0	18.7
Canberra	19.9	44.9	29.5	5.6
CDU	15.6	25.9	35.5	23.0
CQU	21.6	43.4	26.4	8.6
CSU	14.2	36.8	26.1	22.9
Curtin	29.2	42.8	12.4	15.6
Deakin	20.5	29.4	35.9	14.2
ECU	16.4	24.0	43.1	16.4
Flinders	20.1	19.2	35.9	24.8
Griffith	18.2	38.7	31.1	12.0
JCU	19.9	21.2	34.2	24.7
La Trobe	17.0	31.0	29.5	22.5
Macquarie	14.4	54.5	28.5	2.7
Melbourne	41.2	26.3	19.7	12.7
Monash	36.0	36.5	19.9	7.6
Murdoch	25.1	32.8	31.2	10.9
Newcastle	29.1	17.2	33.8	19.9
Queensland	33.1	22.4	25.5	19.0
QUT	29.6	31.3	25.7	13.4
RMIT	40.9	39.0	9.9	10.3
SCU	11.0	42.2	31.4	15.5
Swinburne	49.9	38.0	11.1	1.0
Sydney	29.0	18.2	28.5	24.2
Tasmania	29.0	22.6	32.5	15.9
UNE	17.1	24.1	53.1	5.7
UniSA	21.5	27.9	26.6	24.0
UNSW	48.8	25.4	17.0	8.8
USC	22.0	35.3	30.6	12.0
USQ	30.3	31.2	29.2	9.3
UTS	40.3	41.4	8.7	9.5
UWA	42.9	32.0	12.0	13.1
UWS	22.3	33.5	29.6	14.7
Victoria	18.9	47.0	19.5	14.7
Wollongong	33.9	31.7	25.5	8.9
Average	28.3	32.5	25.8	14.4

Notes: Sciences includes Computing, Engineering, Architecture and Agriculture; Business includes Economics and Law; Humanities includes Arts and Education. The categories are not exhaustive but the shares have been rescaled to sum to 100 per cent.

List of Universities

ACU	Australian Catholic University
Adelaide	University of Adelaide (GO8)
ANU	Australian National University (GO8)
Ballarat	University of Ballarat
Canberra	University of Canberra
CDU	Charles Darwin University
CQU	Central Queensland University
CSU	Charles Sturt University
Curtin	Curtin University of Technology (ATN)
Deakin	Deakin University
ECU	Edith Cowan University
Flinders	Flinders University of South Australia (IRUA)
Griffith	Griffith University (IRUA)
JCU	James Cook University (IRUA)
La Trobe	La Trobe University (IRUA)
Macquarie	Macquarie University (IRUA)
Melbourne	University of Melbourne (GO8)
Monash	Monash University (GO8)
Murdoch	Murdoch University (IRUA)
Newcastle	University of Newcastle (IRUA)
Queensland	University of Queensland (GO8)
QUT	Queensland University of Technology (ATN)
RMIT	RMIT University (ATN)
SCU	Southern Cross University
Swinburne	Swinburne Institute of Technology
Sydney	University of Sydney (GO8)
Tasmania	University of Tasmania
UNE	University of New England
UniSA	University of South Australia (ATN)
UNSW	University of New South Wales (GO8)
USC	University of the Sunshine Coast
USQ	University of Southern Queensland
UTS	University of Technology, Sydney (ATN)
UWA	University of Western Australia (GO8)
UWS	University of Western Sydney
Victoria	Victoria University
Wollongong	University of Wollongong

GO8 = Member of Group of Eight

ATN = Member of Australian Technology Network

IRUA = Member of Innovative Research Universities Australia

Appendix Tables

Table A1: ESI/USI Journal Publications by Discipline

University	Science	IT	Engineering	Health	Education	Economics & Business	Social Sciences & Humanities
ACU	0.0	0.0	0.0	0.0	16.6	0.7	1.1
Adelaide	47.4	0.0	25.7	32.3	11.7	23.2	30.0
ANU	100.0	50.1	49.5	24.9	13.5	93.1	93.2
Ballarat	0.0	0.0	0.0	0.0	5.5	2.2	0.2
Canberra	0.0	0.0	0.0	0.0	8.6	2.8	1.0
CDU	0.0	0.0	0.0	2.0	2.5	0.7	0.9
CQU	0.0	0.0	0.0	0.0	16.0	3.0	0.2
CSU	1.9	0.0	0.0	0.0	16.0	5.2	14.8
Curtin	5.1	0.0	23.8	4.4	62.0	20.1	26.6
Deakin	3.5	0.0	5.4	4.0	39.3	12.5	31.7
ECU	0.0	0.0	0.0	0.0	32.5	8.2	16.2
Flinders	2.9	0.0	0.0	11.6	17.2	8.2	31.0
Griffith	7.0	0.0	18.6	6.6	28.8	22.5	39.0
JCU	19.1	0.0	0.0	3.9	22.1	6.1	1.7
La Trobe	10.1	0.0	0.0	11.5	33.7	24.5	46.6
Macquarie	14.6	0.0	9.7	6.2	20.9	13.9	27.4
Melbourne	68.5	87.4	64.5	100.0	53.4	100.0	83.7
Monash	42.9	100.0	71.9	63.5	63.2	73.8	63.4
Murdoch	7.6	0.0	0.0	3.3	20.2	5.4	14.2
Newcastle	9.9	0.0	39.3	16.8	21.5	11.3	39.4
Queensland	79.1	92.5	62.1	79.3	100.0	60.6	91.5
QUT	4.5	56.0	30.7	6.8	84.0	37.4	28.9
RMIT	0.0	0.0	9.0	0.0	6.1	11.0	0.6
SCU	0.0	0.0	0.0	0.0	6.7	1.5	0.1
Swinburne	0.0	0.0	0.0	0.0	0.6	1.3	0.7
Sydney	90.4	76.0	94.2	97.8	57.7	47.4	100.0
Tasmania	27.0	0.0	10.5	4.0	13.5	11.3	23.7
UNE	10.0	0.0	0.0	0.0	19.0	18.4	23.8
UniSA	0.0	0.0	16.5	3.6	31.9	16.7	15.6
UNSW	65.7	98.6	100.0	57.6	22.1	92.9	73.1
USC	0.0	0.0	0.0	0.0	0.0	0.9	0.2
USQ	0.0	0.0	0.0	0.0	19.0	6.3	1.2
UTS	0.0	0.0	17.6	0.0	27.0	27.5	14.9
UWA	53.0	0.0	50.0	47.7	23.3	47.0	36.7
UWS	1.4	0.0	0.0	0.0	50.9	20.4	19.9
Victoria	0.0	0.0	0.0	0.0	3.7	6.1	1.4
Wollongong	5.2	0.0	32.0	2.8	9.8	11.9	16.9

Table A2: ESI/USI Journal Citatations by Discipline

University	Science	IT	Engineering	Health	Education	Economics & Business	Social Sciences & Humanities
ACU	0.0	0.0	0.0	0.0	5.3	0.2	0.0
Adelaide	35.5	0.0	20.6	26.2	3.9	16.6	21.2
ANU	100.0	56.8	41.5	29.5	7.7	93.7	72.3
Ballarat	0.0	0.0	0.0	0.0	6.0	0.5	0.0
Canberra	0.0	0.0	0.0	0.0	1.8	0.7	0.0
CDU	0.0	0.0	0.0	1.8	2.1	0.0	0.0
CQU	0.0	0.0	0.0	0.0	10.9	1.9	0.0
CSU	1.0	0.0	0.0	0.0	4.9	4.1	11.1
Curtin	5.3	0.0	14.9	2.6	43.2	11.7	23.4
Deakin	1.3	0.0	5.0	3.3	29.8	5.3	27.9
ECU	0.0	0.0	0.0	0.0	23.2	6.5	13.4
Flinders	1.9	0.0	0.0	9.0	8.4	4.1	22.3
Griffith	3.8	0.0	12.6	4.0	20.7	10.9	21.7
JCU	14.7	0.0	0.0	1.8	33.7	6.8	0.0
La Trobe	8.0	0.0	0.0	8.4	31.9	12.5	40.9
Macquarie	13.9	0.0	8.0	4.4	9.1	10.3	18.7
Melbourne	55.3	100.0	75.9	100.0	33.3	97.3	60.6
Monash	35.4	82.0	55.6	64.4	34.4	54.1	36.7
Murdoch	2.9	0.0	0.0	3.9	6.3	4.2	11.7
Newcastle	6.0	0.0	40.5	15.1	7.0	9.2	35.9
Queensland	57.4	84.5	56.3	77.0	100.0	42.6	66.5
QUT	2.6	39.5	25.1	4.5	81.8	32.3	22.6
RMIT	0.0	0.0	7.7	0.0	2.5	3.3	0.1
SCU	0.0	0.0	0.0	0.0	4.6	0.6	0.0
Swinburne	0.0	0.0	0.0	0.0	0.4	1.1	0.1
Sydney	64.4	48.1	100.0	96.6	41.4	50.0	100.0
Tasmania	18.4	0.0	12.4	3.1	4.2	8.1	11.7
UNE	5.2	0.0	0.0	0.0	5.3	19.2	14.9
UniSA	0.0	0.0	12.0	1.9	22.1	12.5	9.2
UNSW	50.0	54.3	89.3	55.7	18.6	100.0	70.2
USC	0.0	0.0	0.0	0.0	0.0	0.2	0.0
USQ	0.0	0.0	0.0	0.0	30.2	18.1	0.0
UTS	0.0	0.0	9.9	0.0	30.2	26.1	11.4
UWA	37.0	0.0	45.5	46.6	18.2	48.4	31.9
UWS	0.5	0.0	0.0	0.0	66.7	5.8	14.8
Victoria	0.0	0.0	0.0	0.0	1.1	2.2	0.0
Wollongong	3.1	0.0	24.3	2.6	8.1	8.9	11.7

Table A3: Nationally Competitive Grants

University	Science & Agriculture	Engineering & IT	Architecture	Health	Education	Management & Commerce	Society & Culture	Creative Arts
ACU	0.1	0.0	0.0	0.3	9.7	0.0	2.6	0.0
Adelaide	46.8	19.4	0.0	35.7	0.0	8.0	8.0	19.5
ANU	100.0	39.6	0.0	19.1	5.2	7.9	100.0	50.7
Ballarat	1.1	0.0	0.0	0.5	5.9	0.0	2.3	0.0
Canberra	2.9	0.0	13.5	0.0	0.0	0.0	6.5	0.0
CDU	5.7	0.3	0.0	0.2	8.4	0.0	2.0	0.0
CQU	0.0	0.3	0.0	0.4	3.4	0.0	0.8	0.0
CSU	1.3	0.0	0.0	0.1	13.9	1.7	4.2	0.0
Curtin	8.7	15.8	0.0	4.1	28.5	0.0	4.7	3.0
Deakin	2.7	17.3	37.7	3.2	31.6	7.9	3.8	0.0
ECU	0.7	1.5	0.0	0.9	5.9	6.1	1.7	0.0
Flinders	7.2	1.8	0.0	11.7	5.9	0.0	12.7	0.0
Griffith	7.7	7.0	7.3	4.7	36.7	15.9	20.7	25.4
JCU	9.4	2.6	0.0	2.8	4.0	0.0	0.9	0.0
La Trobe	8.5	0.0	0.0	5.8	10.9	0.0	23.5	0.0
Macquarie	19.2	17.2	0.0	2.0	0.0	26.5	19.4	9.0
Melbourne	76.5	56.6	94.7	100.0	100.0	40.9	79.7	97.5
Monash	47.0	61.4	0.0	66.6	76.6	21.2	38.0	29.5
Murdoch	12.7	2.0	0.0	3.4	5.6	0.0	3.7	3.0
Newcastle	16.9	42.8	12.6	13.1	10.3	0.0	7.7	0.0
Queensland	84.2	81.1	34.7	52.0	75.0	56.3	54.6	5.2
QUT	10.9	24.7	47.9	5.6	62.9	57.0	17.3	21.5
RMIT	6.4	16.4	71.8	0.7	34.3	1.7	6.6	38.9
SCU	4.3	0.6	0.0	0.0	0.0	0.0	0.6	5.4
Swinburne	0.0	36.9	0.0	0.0	0.0	0.0	7.3	3.1
Sydney	96.1	94.7	62.5	81.2	87.4	85.7	80.1	60.2
Tasmania	20.4	4.4	0.0	1.4	34.8	0.0	11.6	17.8
UNE	4.5	0.0	0.0	0.1	14.8	0.0	8.6	12.0
UniSA	9.6	38.7	4.7	4.3	7.4	6.2	5.9	0.0
UNSW	60.3	100.0	100.0	41.3	0.8	100.0	55.5	100.0
USC	0.3	0.0	0.0	0.0	0.0	3.1	0.0	0.0
USQ	0.0	4.5	0.0	0.0	8.1	0.0	0.1	0.0
UTS	5.3	30.5	5.5	1.5	7.6	51.6	12.1	8.6
UWA	45.9	38.7	12.7	43.6	12.8	26.0	24.1	15.0
UWS	1.4	5.4	0.0	0.5	75.2	0.0	14.8	13.1
Victoria	0.0	3.5	0.0	0.1	0.0	0.0	0.9	0.0
Wollongong	14.5	45.7	0.0	1.9	11.5	40.6	11.7	20.9

Table A4: Federation Fellows

University	Science & Agriculture	Engineering & IT	Architecture	Health	Society & Culture	Creative Arts
ACU	0.0	0.0	0.0	0.0	0.0	0.0
Adelaide	21.4	0.0	0.0	0.0	16.7	0.0
ANU	35.7	100.0	0.0	33.3	100.0	0.0
Ballarat	0.0	0.0	0.0	0.0	0.0	0.0
Canberra	0.0	0.0	0.0	0.0	0.0	0.0
CDU	0.0	0.0	0.0	0.0	0.0	0.0
CQU	0.0	0.0	0.0	0.0	0.0	0.0
CSU	0.0	0.0	0.0	0.0	0.0	0.0
Curtin	0.0	0.0	0.0	0.0	0.0	0.0
Deakin	0.0	20.0	0.0	0.0	0.0	0.0
ECU	0.0	0.0	0.0	0.0	0.0	0.0
Flinders	0.0	0.0	0.0	0.0	0.0	0.0
Griffith	14.3	0.0	0.0	0.0	0.0	0.0
JCU	14.3	0.0	0.0	0.0	0.0	0.0
La Trobe	7.1	0.0	0.0	0.0	0.0	0.0
Macquarie	21.4	0.0	0.0	0.0	16.7	0.0
Melbourne	50.0	60.0	100.0	100.0	50.0	0.0
Monash	42.9	20.0	0.0	0.0	16.7	0.0
Murdoch	0.0	0.0	0.0	0.0	0.0	0.0
Newcastle	0.0	20.0	0.0	0.0	0.0	0.0
Queensland	92.9	60.0	0.0	66.7	66.7	0.0
QUT	0.0	0.0	0.0	0.0	16.7	0.0
RMIT	0.0	0.0	100.0	0.0	0.0	0.0
SCU	0.0	0.0	0.0	0.0	0.0	0.0
Swinburne	0.0	0.0	0.0	0.0	0.0	0.0
Sydney	100.0	60.0	0.0	33.3	50.0	0.0
Tasmania	7.1	0.0	0.0	0.0	0.0	0.0
UNE	0.0	0.0	0.0	0.0	0.0	0.0
UniSA	0.0	0.0	0.0	0.0	0.0	0.0
UNSW	35.7	40.0	0.0	33.3	16.7	100.0
USC	0.0	0.0	0.0	0.0	0.0	0.0
USQ	0.0	0.0	0.0	0.0	0.0	0.0
UTS	0.0	0.0	0.0	0.0	16.7	0.0
UWA	21.4	20.0	0.0	0.0	16.7	0.0
UWS	0.0	0.0	0.0	0.0	0.0	0.0
Victoria	0.0	0.0	0.0	0.0	0.0	0.0
Wollongong	0.0	20.0	0.0	0.0	0.0	0.0

Table A5: Doctoral Completions

University	Science	IT	Engin	Archit	Agric	Health	Educ	Mngment& Commerce	Society & Culture	Creative Arts
ACU	0.0	0.0	0.0	0.0	1.1	0.5	32.0	0.0	3.7	0.0
Adelaide	41.5	0.0	16.7	27.6	97.9	32.7	6.6	2.9	23.9	6.4
ANU	85.0	0.0	10.6	0.0	27.4	4.3	0.0	1.9	89.3	14.9
Ballarat	2.9	12.1	0.0	0.0	0.0	1.5	0.8	3.8	7.5	2.1
Canberra	5.0	1.7	0.0	27.6	0.0	0.0	9.0	5.8	1.4	27.7
CDU	4.5	1.7	0.6	0.0	8.4	1.0	4.1	1.0	4.3	0.0
CQU	5.8	20.7	1.2	0.0	1.1	0.8	11.5	1.9	0.3	0.0
CSU	0.0	0.0	0.0	0.0	33.7	2.5	9.0	6.7	8.1	0.0
Curtin	22.3	25.9	12.2	10.3	10.5	11.4	100.0	40.4	19.6	25.5
Deakin	13.9	15.5	9.4	10.3	0.0	5.3	26.2	24.0	34.0	0.0
ECU	2.4	13.8	1.8	0.0	5.3	4.3	18.9	13.5	11.0	34.0
Flinders	18.9	6.9	1.8	0.0	0.0	15.2	0.0	0.0	34.9	0.0
Griffith	10.8	31.0	8.8	3.4	60.0	7.9	45.1	42.3	28.8	57.4
JCU	27.6	3.4	3.0	0.0	21.1	3.6	9.8	9.6	11.0	8.5
La Trobe	26.0	22.4	1.8	0.0	7.4	20.1	30.3	21.2	38.0	29.8
Macquarie	17.6	10.3	0.6	3.4	7.4	0.8	12.3	41.3	45.0	31.9
Melbourne	100.0	8.6	43.2	93.1	75.8	87.1	85.2	34.6	100.0	57.4
Monash	55.6	100.0	36.8	0.0	2.1	57.6	50.8	100.0	66.0	14.9
Murdoch	16.3	10.3	2.4	0.0	25.3	4.1	18.0	23.1	21.0	40.4
Newcastle	21.8	15.5	17.9	24.1	1.1	8.6	18.9	10.6	25.4	55.3
Queensland	91.3	70.7	50.2	65.5	100.0	59.1	39.3	52.9	80.4	38.3
QUT	22.0	24.1	26.1	27.6	0.0	12.7	43.4	22.1	9.8	63.8
RMIT	25.2	51.7	31.0	55.2	0.0	4.1	33.6	46.2	10.1	68.1
SCU	4.2	5.2	0.0	0.0	7.4	4.1	3.3	79.8	2.6	12.8
Swinburne	10.0	0.0	19.8	0.0	0.0	0.5	0.0	38.5	8.9	0.0
Sydney	82.2	31.0	26.4	100.0	49.5	100.0	41.8	34.6	94.2	100.0
Tasmania	31.2	8.6	3.0	3.4	82.1	6.1	23.0	5.8	14.1	44.7
UNE	23.1	0.0	0.9	0.0	25.3	0.5	36.9	21.2	17.0	4.3
UniSA	4.7	22.4	25.5	24.1	2.1	7.4	33.6	70.2	9.5	8.5
UNSW	60.4	13.8	100.0	93.1	0.0	45.2	14.8	76.0	50.1	95.7
USC	0.3	0.0	0.0	0.0	1.1	0.0	0.0	3.8	0.6	8.5
USQ	2.4	0.0	8.5	0.0	0.0	0.3	11.5	3.8	2.6	0.0
UTS	17.3	31.0	6.7	10.3	0.0	4.8	35.2	26.0	11.8	36.2
UWA	50.9	6.9	24.9	17.2	92.6	29.4	31.1	57.7	35.2	6.4
UWS	13.6	5.2	2.7	0.0	25.3	2.5	22.1	24.0	26.8	40.4
Victoria	9.7	1.7	5.8	0.0	0.0	2.8	9.0	36.5	17.0	0.0
Wollongong	21.3	27.6	24.0	0.0	7.4	3.6	17.2	17.3	17.6	85.1