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# Exploring the Extent and Nature of the Diversity of the Doctoral Population in Australia: A Profile of the Respondents to a 2005 National Survey

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## Abstract

Although there is general agreement that diversity is a feature of doctoral education in Australia, there are various forms and levels of diversity, many of which are not captured by analyses that rely on categories for analysing the doctoral education population that are those commonly used in education at the undergraduate level, such as sex, age, mode of study, type of enrolment, citizenship, and Broad Field of Study, etc. These categories primarily reflect concerns to do with funding and issues of participation and equity. Our analysis of data from a national survey of doctoral candidates carried out in 2005 as part of a Linkage Grant project 'Reconceptualising the doctoral experience', suggests that not all of these categories are relevant to critical concerns for doctoral education. Nor do analyses at a macro-level represent the particularity of the doctoral experience. They can mask the reality of a highly variable student population, and one that is not necessarily represented accurately or helpfully by ascribing group identities.

## Introduction

The existence of doctoral candidate diversity has been substantiated in national studies (eg. Pearson & Ford 1997; Neumann 2003), while the exponential increase in doctoral candidate numbers has led to an expectation of increased diversity. Yet there has been little national quantitative data beyond that available from official government statistics that give data such as age, sex, enrolment status, and award programs, to give a more detailed account of the nature and extent of the variation in the doctoral population and their experience. Moreover, the assumption that growth leads to diversity is problematic at the system level (Pearson et al. 2008). A comparison of national data on candidate characteristics, age, sex, enrolment status and Broad Fields Of Study (BFOS), from 1996 and 2004, shows a relatively stable system for doctoral education despite the growth in numbers. This raises questions as to the type and extent of diversity being reported and how it might best be represented.

In this paper, we draw on a national survey of doctoral scholars in 2005 that sought to generate more detailed and current national data about the characteristics and activities of contemporary doctoral candidates that went beyond the macro-level data collected nationally by the government. These data were sought for a research project funded by the Australian Research Council Linkage Program with the Council of Australian Postgraduate Associations (CAPA), Deakin University Students' Association and the Australian National University (ANU) Postgraduate and Research Students' Association. The project developed detailed information about the contemporary doctoral experience focusing on the inter-relationship and significance of doctoral candidates' workforce participation, family and domestic responsibilities, work training and career development.

A related aim is to develop new tools for data collection and analysis to inform policy making and implementation. As established by Thompson et al. (2001), a barrier to data collection in doctoral education is a restricted discourse and a lack of terminology with shared meaning among practitioners. Moreover, as Ross (2001) concludes, many of the models and categories in use for analysing postgraduate study are in fact drawn from the undergraduate literature and experience and are not necessarily appropriate for doctoral education. Current institutional data collection practices have been established to satisfy government reporting requirements with a focus on issues such as funding, participation, and efficiency. These do not produce sufficient, nor necessarily appropriate data, to assist in monitoring internal institutional quality, to inform educational decision making on issues in curriculum and supervision, nor assist other stakeholders such as student associations in assessing their members' needs nationally and locally.

### **The National Online Survey 2005**

The national survey of doctoral candidates in Australia was administered in mid 2005. Planning and development associated with the conduct of the national online survey was extensive. Following approval by Ethics Committees at ANU and Deakin University, survey trial and pilot exercises were conducted at these two institutions. With the support of the Deans and Directors of Graduate Studies (DDoGS) and the Council of Australian Postgraduate Associations (CAPA), the final version of the survey was administered over a six-week period in July-August 2005. In the last week in June, the 41-item questionnaire was located on the CAPA website and invitations were extended to candidates enrolled in Australian universities to participate in this survey.

Just below fifteen percent of the national doctoral population responded. The data were collected in a de-identified form to preserve anonymity for both individuals and institutions. Following a preliminary analysis of the descriptive data and some minor adjustments, the data set comprising 5,395 cases was finalised in December 2005. In the analyses that follow this is the number on which calculations are based unless indicated otherwise.<sup>3</sup>

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<sup>3</sup> Unless elsewhere specified, the following reporting conventions have been followed: (1) All percentages reported represent the number of respondents that answered a question in a particular way divided by the total respondents to the survey. (2) Conservative statistical criteria have been used so that results have only been reported as 'significant' if they were statistically significant at a = .05 level and also represent a difference between means of more than five percent. (3) Similarly conservatively, where multiple comparisons have been conducted, for example, to identify the nature of significant differences between more than two groups, a Bonferroni correction has been used. This is to ensure that the probability of finding a significant result due to chance within any set of comparisons was not increased beyond the 5% level.

## The 2005 survey respondent profile

- The profile of the responding candidates can be characterised as follows:
- 62% female
- 31/35 median/mean age
- 70% full time enrolment, 4% mixed
- 79% formal mode of attendance 'internal'
- 92% PhD by research, 4% Prof Doc, 3% PhD research and coursework
- 80% Australian citizens
- 70% on scholarships (33% Australian Government scholarships (APA/APAI/IPRS)).

There is also an indication that socio-economic status is varied with almost half of the respondent parents having as their highest level of education either 'school' or 'post-school' education (41%/49% father/mother school only). A much smaller proportion of parents have a PhD (fathers/mothers 6%/2%). Five percent self-describe themselves as having a disability, and less than one percent (44) report they are of Aboriginal or Torres Strait Islander descent.

Although this profile indicates some diversity, as indeed is the case for the national profile, it could be taken to support the longstanding conventional view that the majority of doctoral candidates are full-time, male and on campus undertaking a PhD award program. The major obvious difference from this earlier conventional thinking is that the number of women candidates has been growing to reach parity nationally in 2005.

What follows is an analysis of the survey data to explore further the nature and extent of diversity of this doctoral population, their characteristics and activities and the implications for representing that diversity. However, caution must be taken in generalising on aspects where there is noticeable difference from the national profile (Appendix A). Some of the variation from the national profile – particularly more in the younger age group, and fewer 'internal' enrollees – may be accounted for by the preponderance of those in their first eighteen months of enrolment, that is, 45% of the respondents first enrolled in 2004 and 2005, and the complexities of determining the meaning of enrolment and attendance status that are examined further below. Across BFOS the respondent breakdown is similar to the national populations except for an overrepresentation of scholars in the BFOS Health, and the patterns of age and sex within BFOS are similar to those identified in earlier analyses in 1996 and 2004 (Pearson & Ford 1997; Pearson et al. 2008).

## Characteristics

### Variation in age and family circumstances

The median (31) and mean (35) ages of respondents supports the contemporary view that candidates are most likely to be in their thirties rather than their twenties, but this does not reveal the extent of the actual variation. There are varying means across BFOS. Education (mean age 45) is an outlier as are Engineering and Related Technologies, and the Natural and Physical Sciences (both means 29), a pattern to be expected (Pearson & Ford 1997; Pearson et al 2008). However, the survey candidates span a wide age range: 16 – 81 years with varying age distributions within BFOS. Table 1 shows that a wide age range is a feature of all the BFOS that is, within group differences may be as important as those among groups.

Additional characteristics of the respondent population gained from the survey, but unavailable nationally, give some indication of family and socio-economic circumstances. They indicate, as does the age range of the candidates, that many are neither young nor unattached. Most (58%) live with

spouses/partners and/or with dependent children (27%). There is no clear relationship between mean ages, BFOS or family circumstances. While 73% of those in Education reported themselves to be living with a spouse or partner, 47% in the Natural and Physical Sciences also reported this to be the case, as did 49% in Engineering and Related Technologies (mean age 28.95). Those in Agriculture, Environmental and Related Studies, Engineering and Related Technologies and Natural and Physical Sciences had significantly fewer dependent children. Analysis showed that the number of children within BFOS was similar for men and women, but age was the variable most strongly associated with the number of children.

**Table 1. Age of respondents across BFOS: means and range**

Broad Fields Of Study/ means	Mean	Std. Deviation	Minimum boundary	Maximum boundary
Agriculture, Environmental and Related Studies	32.89	9.196	21	70
Architecture and Building	38.26	9.407	24	68
Creative Arts	40.03	11.931	21	75
Education	45.15	10.134	21	81
Engineering and Related Technologies	28.95	6.970	21	60
Health	34.47	10.343	21	76
Information Technology	34.09	10.466	21	80
Management and Commerce	38.31	10.429	22	78
Natural and Physical Sciences	28.63	7.809	16	74
Society and Culture	37.26	11.545	21	70
All respondents	34.75	11.011	16	81

### Mode and type of attendance

The difficulties of generalising about mode (internal/external/multi-modal) and type (full-time, part-time) of attendance have been raised in a previous study (Pearson & Ford 1997). More recently, since these two aspects of attendance have been collected as separate categories by the relevant government department, Pearson and et al. (2008) have been able to show that there is a limited relationship between mode of attendance and enrolment status (p. 363, Table 2). So, for example, in 2004, while only 25% of Education respondents were full-time, 70% were categorised as 'internal' attendees. This questions the meaning of the category 'internal', and suggests that these categories mask rather than reveal the particularity of circumstance. The survey data provide further detail to inform discussion about these categories.

### Type of attendance and intensity of enrolment

Calculating changes in the proportion of full-time to part-time candidates in the doctoral population has also been complicated by changes in the reporting categories in use (Pearson et al. 2008). We can establish that in 1996 at least 61% were enrolled as full-time, with relatively small increases and decreases over time, probably due to policy changes such as the introduction of the Research Training Scheme (RTS) (Evans, 2002). What is not documented, is the extent of movement between attendance types which is a further complicating

factor. In the survey, respondents were asked to give their enrolment status at the year they commenced and at the time of the survey. This enabled the enrolment status of individuals to be tracked on a national basis, something that is impossible using Department of Employment, Education and Workplace Relations (DEEWR) annual datasets. Thus, the results from the survey showed that 20% of the population had changed their enrolment status at least once during their candidature to the point of its administration. Of the remaining respondents, 64% had always enrolled as full-time and 16% had spent the whole of their candidature as part-time as shown in Table 2.

**Table 2. Summary of enrolment history (%)**

Enrolment status of respondents throughout candidature (n=5391)	
Always part-time	16
Changed status	20
Always full-time	64

It might be expected that if an analysis were undertaken for candidates who completed their candidature, the proportion who changed enrolment status would be greater than the population at any one time, as full-time candidates who use up all their scholarship time may change to part-time candidature (Table 3). There was evidence of this effect in the survey population where 48% (53% of whom were full-time at commencement) changed status by their fourth year of candidature (Ryland, 2007).

**Table 3. Percentage of respondents who changed status by the number of years enrolled (n = 4239)**

Number of years enrolled	Percent of respondents who changed status (%)
1	8
2	12
3	26
4	48
5	60
6	62
7	65
8	66
9	65

These data demonstrate that the categories of 'full-time' and 'part-time' do not represent stable or discrete groups of candidates.

The fluidity of enrolment status also raises a major issue of how to capture more accurately enrolment status for individual candidates. Under the current conception it is necessary to identify a point in time or candidature to analyse a population's enrolment status. For example, you could choose the commencement status of candidates to analyse their enrolment status, but as has been shown, 20% of the population changed their status. Alternatively, one

could choose the population's enrolment status at completion, however, as shown by the survey, many full-time candidates change status in the latter part of their candidature. For such reasons, Ryland (2007), proposes a new measure termed the 'load intensity'. Load intensity is the average enrolment load over the duration of doctoral study. It uses the value 1.0 for each whole year spent full-time, 0.5 for each whole year spent part-time. This gives, for example, a value of 0.75 for a year of an equal mix of full-time and part-time. Thus 'load intensity' for candidates who do not change status is 1.0 for full-time, and 0.5 for part-time, and candidates who spent four years as full-time and one year as part-time have a load intensity of 0.9 (Ryland, 2007).

This measure allows a more accurate picture of enrolment patterns. Candidates who have a load intensity over 0.75 would have spent a predominant part of the candidature as full-time with some part-time study, whilst those with load intensity below 0.75 would have spent the predominant part of their study part-time. Also, by using this measure the need to identify a specific point in the candidature to measure the candidates' enrolment status is obviated.

### Mode of attendance

The majority (79%) of respondents gave their formal mode of attendance as 'internal (on campus)'. Of these, significantly fewer were in Education (62%) and Health (67%), and significantly more were in Engineering and Related Technologies (91%), Information Technology (89%), Natural and Physical Sciences (85%), and Society and Culture (82%). We analysed whether these 'internals' were actually on campus. Respondents listed which doctoral activities they had pursued in the previous seven days, and then gave where they had undertaken the majority of these activities during that time. Table 4 shows the range of locations for doctoral activities, the university and the home being the most popular. This table shows that the majority of respondents were not 'on campus' for the majority of their doctoral activities in the week prior to completing the survey. This is supported by data discussed subsequently of the locations of resources used for doctoral study (Table 21).

**Table 4. Location for undertaking the majority of doctoral activities in past seven days (%)**

Location	Percent
On-campus	42
Home	33
Research Centre	8
Workplace	5
Field	3
Other	4
No response	5
Total	100

The pattern of locations varies across BFOS, but in all cases, at least 30% are likely to be off campus at any given time. Within the BFOS with significantly fewer by chance reporting as 'internals' the most common four locations are as follows: Education 55% at home, 22% on-campus, 6% in the workplace, 5% in the field; Health 35% on-campus, 28% at home, 17% at research centre, and 9% in the workplace. In those, BFOS reporting significantly more than by chance 'internals' the most common four locations are as follows: Engineering and Related Technologies 69% on-campus, 16% at home, 6% in a research

centre, and 4% in the workplace; Information Technology 51% on-campus; 27% at home, 6% workplace, 4% other location; Natural and Physical Sciences 63% on-campus, 13% in a research centre, 11% at home, 5% in the workplace; and Society and Culture has 50% at home, 32% on-campus, 4% in the field and less than 4% other location (Table 5).

**Table 5. Location for undertaking the majority of doctoral activity in the past 7 days in selected BFOS (%)**

Location/BFOS	Education	Health	Engineering and Related Technologies	Information Technology	Natural and Physical Sciences	Society and Culture
On campus	22	35	69	51	63	32
Home	55	28	16	27	11	50
Research centre	1	17	6	3	13	3
Workplace	6	9	4	6	5	3
Field	5	4	<1	1	2	4
Other	2	4	3	4	2	4

### Scholarship (non) holders

The majority of domestic candidates have scholarships of some kind, however, this is not the case for all doctoral candidates. Thirty percent of respondents reported not holding any scholarship, 33% specified holding an APA, APA(I) (both stipends) or IPRS (tuition scholarship for international candidates), and 23% held university scholarships. A few (22) nominated fee exemption scholarships only. There is no significant gender difference between those holding and not holding a scholarship. There is a highly significant relationship between enrolment status and scholarship (non) holding with 89% of scholarship holders being full-time—as is expected given various scholarship requirements and visa rules. However, of those who do not hold a scholarship, while 67% are part-time, 29% are full-time, and 4% report mixed enrolments (Table 6).

**Table 6. Scholarship (non) holding by enrolment status (%)**

	Full-time	Part-time	Mixed	Total
Scholarship (n=3690)	89	8	3	100
No Scholarship (n=1598)	29	67	4	100

Table 7 shows that there are significant, but unsurprising, differences across BFOS. More candidates in Agriculture, Environmental and Related Studies, Engineering and Related Studies, and Natural and Physical Sciences have scholarships, in contrast to those in Creative Arts, Education, Management and Commerce, and Society and Culture, who do not have scholarships. There is also a difference in those reporting 'other' scholarships, with Agriculture, Environmental and Related Studies and Health, in particular, having nearly as many or more than University scholarships.

**Table 7. Scholarship holding across BFOS (%)**

Broad Fields Of Study/Type of Scholarship	APA/APAI/ IPRS	University	Other	No scholarship
Agriculture, Environmental and Related Studies	37	23	21	19
Architecture and Building	38	32	5	24
Creative Arts	42	16	7	35
Education	18	18	7	54
Engineering and Related Technologies	43	25	18	13
Health	27	19	22	31
Information Technology	24	32	9	34
Management and Commerce	21	25	13	42
Natural and Physical Sciences	40	31	14	14
Society and Culture	37	19	5	38

Table 8 shows a range of 'other' scholarship sources. These include, not only government instrumentalities beyond the higher education sector in Australia, but also various industry and philanthropic agencies. A small number of respondents nominated providers not included in this table, such as, 'the World Bank, the Asian Development Bank, Smart Internet Technology, Road Traffic Authority and the Australian Institute of Sport, indicating even greater diversity than shown in Table 8.

**Table 8. Providers of 'other' doctoral scholarships identified by respondents**

'Other' doctoral scholarship providers	Frequency
NHMRC—National Health & Medical Research Council	102
CRC—Cooperative Research Centre	76
Overseas Government	42
Foundation	37
Industry, company (other than APAI or CRC)	35
AusAID	29
ARC—Australian Research Council	17
CSIRO—Commonwealth Scientific & Industrial Research Organisation	15
GRDC—Grains Research & Development Corporation	14
State Government	14

The variation in the value of scholarship (e.g. from small to large scale financial support) suggests that some candidates hold more than one scholarship (for example, an APA plus a 'top-up' from another provider). It is this sort of variation that may explain the surprising number of 'domestic' and 'non-citizens' (284/22) candidates holding scholarships who are also part-time, as does the number of those with scholarships who are of mixed enrolment (3% of scholarship holders), and those with scholarships who first enrolled before 2002 (344, 6%).

### **Citizenship and residency: defining 'international' candidates**

The growth in enrolments of international doctoral candidates in Australia over the past decade or more is reflected in the different growth rates for 1998 to 2004 for international candidates (71% growth) and domestic candidates (27%). The majority of the survey respondents are citizens of Australia (80%) and a small number of the respondents are citizens of New Zealand (3%), or of other countries (20%). The apparent discrepancy in these percentages is explained by a small number (181) who are dual citizens, either of Australia and New Zealand (41), or elsewhere (140). Approximately one fifth of doctoral candidates are international and so this is a 'category' that will increasingly be of interest to universities, and other groups such as CAPA. However, as we argue here, assuming that 'international' is a significantly distinct category from 'domestic' and/or assuming that it is homogenous, is fraught with difficulty. Our research shows that in many ways being 'international' or 'domestic' makes little difference to the experience of being a doctoral candidate, although there are some differences. Again, it is the diversity within and across the categories that is important.

The categories 'international' and 'domestic' are important official government categories, especially because they influence funding. However, beyond this they become problematic. In particular, 'domestic' not only includes Australian citizens and Permanent Residents, but also New Zealand citizens. 'International', therefore, includes everyone else on the planet which, as a moment's reflection shows, is a very diverse 'category' of people. For our survey, international candidates were defined as those who were not Australian citizens or Permanent Residents. However, this means that some 'domestic' candidates are Australian citizens who are also permanent or temporary residents elsewhere. There are also, as noted above, Australian dual or multiple citizens and, in terms of their personal and cultural identities, categorizing them as Australian or international is substantially incorrect. Furthermore, some international candidates obtain Australian permanent residence during candidature and, in government terms, become 'domestic' candidates.

Complexities reside in the data, too. Table 9 shows the extent to which international and domestic candidates' expectations of their doctoral programs were being met at the time of completing the survey (that is, during candidature). It does show that for international candidates the level of satisfaction was generally (81%) as expected or better than expected, which was slightly above the levels for domestic candidates (78%). This does not mean, of course, that all expectations are similar, nor that their perceptions of what constitutes satisfaction are likewise. It does show that the categories international and domestic do not embody great disparities when data are summed and proportioned. One might pose a hypothesis that international candidates were more likely to have a mismatch between their expectations and experience, for example, the Australian PhD program might appear unexpectedly difficult for those more familiar with US-style PhDs, or Australian candidates would be more familiar with the resources and infrastructure and what to expect than their international colleagues.

**Table 9. Respondents' view on expectations being met by residential status (%)**

Response/%	International	Domestic	All respondents
Far better	9	8	8
Better	28	22	23
As expected	44	48	48
Worse	15	17	17
Far worse	5	5	5
Total	100	100	100

Table 10 shows the candidates' numbers of children. Again, what is notable is that there is very little difference in the proportions between international and domestic candidates. Almost three quarters of the candidates have no children, and of those who do, the greatest (almost identical for domestic and international) proportion have one child. The domestic candidates have slightly higher percentages for those with two or three children, and for those with four or more the international candidates are slightly higher. Parents would no doubt argue that there is a considerable difference in the lives of people between those who have no children and those who do; parents of four or more children would probably argue that there was a lot of difference between one child and four or more! What our data show is that being 'international' or 'domestic' is not a meaningful variable.

**Table 10. Numbers of respondents' children by residential status**

Number of children/residential status	International (%)	Domestic (%)	All respondents (%)
0	75	73	75
1	11	11	11
2	10	11	11
3	3	4	4
4	2	1	1
Total	100	100	100

### Academic staff

Given the current interest in employment outcomes for doctoral candidates it is of interest that 30% (1609) responded that their main occupation is as an academic (full-time, part-time, or on study leave) as well as being a doctoral candidate in 2005. Although this figure seems high it is compatible with the research findings of Neumann, Kiley and Mullins (2007, p.11) that in 2005, 51% of doctoral graduates entered higher education employment (including both academic and administrative positions). It is likely too, that many of these positions are for contract and casual academic positions. Nor are all of them looking for a permanent academic career. Only 61% (see Table 24 for further detail) intend to go on to further employment in a university after completion of their doctorate.

## Activities in a week and during the candidature

The survey asked for detail on candidates' activity both during the past seven days, and over the course of a candidature. Data on weekly activity, and over the candidature give an indication of the range of the activities and priorities for doctoral study and research, employment - paid and unpaid, academic employment, leisure, family responsibilities and voluntary and community activity.

### Doctoral and employment activity in a week

The ranked listing of doctoral activity shown in Table 11 reflects the range of candidates from the greater number early in their candidature and those coming to completion.

**Table 11. Respondents participation in doctoral activity during the past seven days**

Doctoral Activity	Percent (%)
Reviewing the literature	75
Thesis writing	45
Data analysis	41
Research design	41
Data gathering	29
Laboratory work	22
Conference presentations	13
Fieldwork	11
Other	10
Generic skills courses	5
Formal coursework	4
IT coursework	1
None	4

The pre-specified items are those more usually referred to but candidates also specified 'other' doctoral activities are shown in Table 12. These include variations of activity identified in this survey item such as writing other than 'thesis' writing, which include seminar papers, journal articles, book chapters and project reports, for example, reports to industry. In addition to making conference presentations, respondents indicated that they presented to, and interacted with, people in a range of internal (departmental, disciplinary) and external settings (industry, health, education sectors).

The examples in Table 12 also reveal a set of categories extending beyond the eleven categories specified, which also include internal variation. Respondents who registered their engagement in formulating applications, for example, mentioned ethics approval, research funding, scholarships/awards and post-doctoral positions. Those undertaking placements specified work and clinical experience, as well as internship. The range of events which respondents organised included conferences, focus groups, courses and field trips. Additional activities identified by a small number of respondents, however, suggest this list might be extended to include 'guiding new candidates', 'managing a lab', 'consultancy' and 'employment'.

**Table 12. Examples of 'other' doctoral activities identified by respondents**

Doctoral Activity	Frequency
Writing (i.e. other than 'thesis writing')	160
Meeting and interacting with a variety of audiences	77
Formulating applications	38
Editing	31
Making presentations (i.e. other than 'conference')	27
Undertaking work placements	18
Training (i.e. other than 'formal', 'generic skills' and 'IT' coursework)	16
Undertaking administrative tasks	15
Organising (e.g. events)	12

Table 13 shows the range of doctoral and non-doctoral activities undertaken in a week with an indication of time spent. Unsurprisingly, the activity undertaken by most of the respondents (95%) was connected with their doctorate, and for the most hours, followed by family or domestic activities, and leisure, though with fewer hours. Paid non-academic employment was undertaken by 35% of the respondents, but mostly for twenty or less hours (21%), whereas 29% undertook paid academic employment (specified as tutoring, demonstrating, marking, lecturing and research assistance) but also for twenty hours or less (23%). A surprising 19% of the respondents undertook unpaid academic activity, although 75% of these candidates undertook five hours or less. These results could be related to the higher number of full-time survey respondents and/or the larger number in their first or second year of enrolment.

**Table 13. Time spent on doctoral and non-doctoral activities undertaken in a week**

Activities / % spending given hours	< 20	21- 40	41+	Number of respondents undertaking activity
Doctoral	34	36	24	5103
Paid non-academic employment	21	9	5	1940
Paid academic work	23	5	2	1594
Unpaid academic employment	18	1	<	976
Family and/or domestic activities	75	12	7	5078
Leisure	86	5	2	4995
Voluntary	31	<	<	1691

### Academic work undertaken during a candidacy

Additional data as to the amount of academic work undertaken during the course of a candidacy show how common this is. Most candidates (4220, 78%) have undertaken at least one of the following activities: tutoring/demonstrating, marking, research assistance and lecturing, or 'other'. Of the total surveyed population, 71% of the respondents are undertaking paid academic activities, 21% are undertaking unpaid academic work, and a further 19% volunteered to

do so, during their candidature. The paid activity undertaken by most respondents is tutoring/demonstrating (58%) as shown in Table 14.

**Table 14. Percentage of respondents undertaking paid academic activities**

Paid academic activities undertaken	Respondents (%)
Tutoring / demonstrating	57
Marking	48
Lecturing	28
Research assistance	30
Other	8

There appears to be a limited connection between this involvement and whether the candidates are holding scholarships or not, with only lecturing being significantly more likely as an activity for non-scholarship holders (Table 15).

**Table 15. Percentage of (non) scholarship holders undertaking paid academic activity**

Paid academic activity undertaken	Hold scholarship (%) N = 3662	No scholarship (%) N = 1597
Tutoring / demonstrating	59	56
Marking	48	51
Lecturing	23	39
Research assistance	30	31

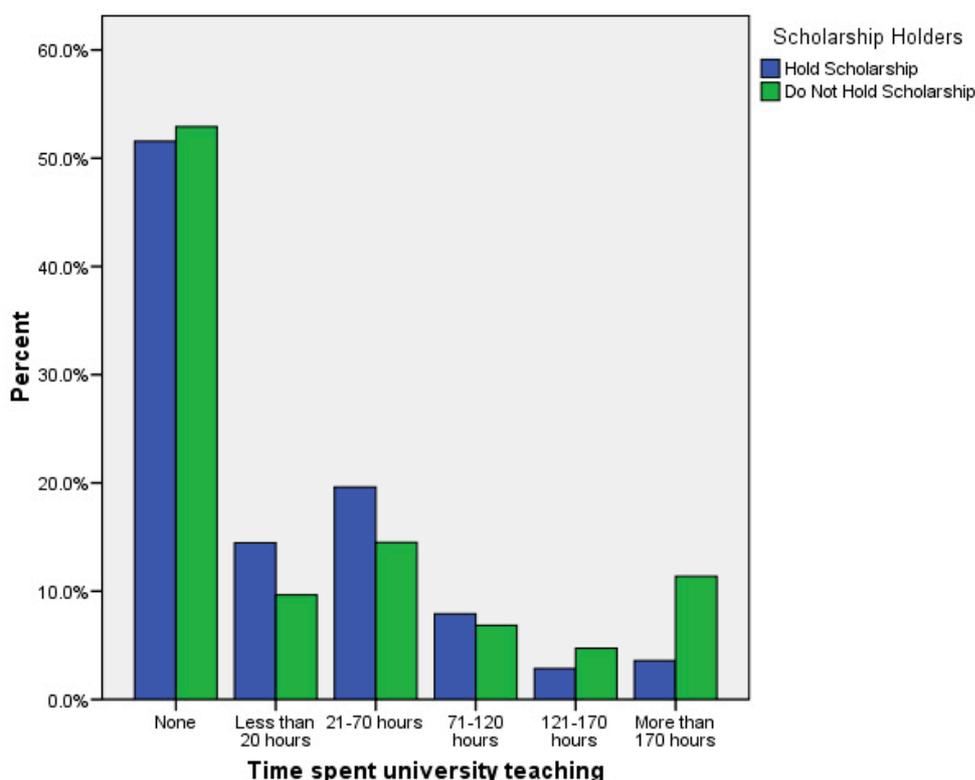
Examples of 'other' paid academic activities identified by respondents are shown in Table 16. These include variations of activity identified in this survey item. The pedagogy category, for example, includes supervising, clinical teaching and mentoring (i.e. as distinct from lecturing, tutoring or demonstrating). A number of respondents highlighted aspects of work undertaken in their role as full-time academics. A key characteristic is that these respondents view themselves as leaders, partners or supervisors of research, rather than merely the providers of 'research assistance'. Similarly, the assessment category identifies respondents as undertaking a broader range of tasks other than 'marking'. Examples include 'clinical examination', 'workplace assessments', and 'examination supervision'.

The examples in Table 16 also reveal a set of categories extending beyond the four categories specified in the survey which are subject to internal variation. Some respondents identified a range of curriculum-based activities, particularly the design or coordination of units, subjects and courses. Others identified a variety of activities under the rubric of administration that included departmental duties such as 'first year administration', 'entering results', and 'archiving course material'. There was also evidence of consultancy and contract work, undertaken in business, industry and other off-campus settings (for example, 'various IT consultancies'). Some respondents made reference to organisational activities in relation to conferences, workshops and 'public events'.

**Table 16. Examples of 'other' academic activities (paid) identified by respondents**

Academic Activity	Number of Respondents
Pedagogy (i.e. other than 'tutoring/demonstrating' or 'lecturing')	82
Curriculum	60
Authentic research (i.e. other than 'research' assistance)	31
Administration	30
Consultancy	21
Assessment (i.e. other than 'marking')	19
Organisation	10

Further information on academic involvement comes from respondent estimates of hours spent in university teaching in the past six months. Of those, 48% who reported undertaking teaching during the past six months, 65% give <70 hours as the time spent teaching. Of those who are teaching, more are scholarship holders, but non-scholarship holders are each teaching more hours (Figure 1).



**Figure 1. Time spent on university teaching**

[Note: percentages are percent of each category of Scholarship status, i.e. percentages for scholarship holders sum to 100% as do the percentages for non-scholarship holders.]

Although 'university level teaching' and the academic activities of tutoring/demonstrating, marking, and lecturing, are not synonymous, aggregated, these data establish how the majority of the candidates are involved in teaching and/or academic work of some kind. It appears that most

of this work is paid, but not all. The issue of payment is complicated by the way in which it is seen as a form of income support, professional development, and participation in the academic community. Additionally, paid and unpaid academic work can be seen as exploitation by those involved, as was also found by Thompson et al (2001) among postdoctoral appointees and their supervisors.

### Family and domestic work

As indicated previously, over 50% of doctoral candidates are living with partners and 27% have children. Therefore, the role of domestic work in the lives of doctoral candidates cannot be ignored. As shown before in Table 13, 94% of the candidates indicate spending time on family and/or domestic activities, with the majority spending up to 20 hours in the past week. There are variations according to enrolment status as shown in Table 17 below. It is of interest that the full-time candidates, both men and women, spend a similar amount of time, but proportionally more part-time men and women spend longer hours on such activity. This could be explained by the greater percentage part-time candidates living with partners (72%) and 42% having children. Survey data show that part-time candidates can spend a mean of eighteen hours a week on family or domestic activities with up to over 35 hours a week for part-time female candidates with three children. In general, male part-time candidates spent less time on family and domestic activities than female candidates. However, this does not necessarily mean that female part-time candidates spend less time on their doctorates than their male counterparts. Other factors also appear to play into the amount of time spent on doctoral activities such as the amount of time spent on paid-work according to Ryland (2007).

**Table 17. Time spent on domestic and family activities by sex and 2005 enrolment status (n = 4978)**

Hours/gender/enrolment status	Full-time (%) (n=3623)		Part-time (%) (n=1355)	
	Female	Male	Female	Male
<b>Did not undertake</b>	2	6	1	3
<b>&lt; 20</b>	79	82	66	78
<b>21 to 40</b>	12	9	18	12
<b>41 to 60</b>	4	1	7	5
<b>Over 60</b>	3	1	8	2

### Doctoral support and training activity

Doctoral support and training can be identified as of at least four types: (1) the involvement, paid or not, in academic activity; (2) structured programs for teacher preparation and practice often with some tutoring practice; (3) activities such as seminars and discussion groups (79% of respondents participated in these activities, the largest group in seminars (60%); and (4) specific structured training activity usually for developing employment related skills. A small number reported undertaking generic skills courses, IT courses and internships in the previous week; whereas, more participation was reported over the whole year, although 48% indicated they had undertaken none, which may reflect the large number of those in their early candidature.

The two latter forms of support and training are provided by a mix of local, central and external agencies: departments, graduate schools, postgraduate student associations, and professional organisations (Table 18). The main providers are departments and faculties.

**Table 18. Providers of doctoral support activities identified by respondents (%)**

Training type/providers	Department / faculty	Graduate school	PG student association	Professional organisation	Other
Seminar series	69	13	7	6	5
Social activities	45	4	26	6	19
Discussion group	60	11	8	7	14
Electronic network	27	11	12	23	27
Writing group	33	29	16	3	19
Other doctoral group	40	11	11	7	31

Another form of training and induction into the academic and research community comes from the academic and professional activity involved in producing publications and patents, presenting at conferences, and giving interviews (Table 19).

**Table 19. Outcomes for which respondents consider themselves primarily responsible during the course of their candidature (%)**

Outcomes/number	1	2-9	10+	None
Presentation—in Australia	24	46	2	28
Refereed publication	23	26	1	50
Presentation—outside Australia	22	16	1	61
Non-refereed publication	15	20	1	64
Media interview	10	7	1	82
Other	5	7	1	88
Patent, commercial product	2	<1	<1	97

## Capabilities

So far the focus has been on training input, as is often the case in the discourse of employability skills (Craswell 2007). The survey respondents were asked to give their view on which capabilities they perceived had transferred from their doctoral to employment and vice versa. Respondents were given the choice of eleven pre-determined capabilities, plus the options 'other' and 'none of the above'. They were able to choose as many as they wished. Table 20 gives respondents' perceptions of their capability transfer. It shows that the candidates see the traffic being both ways, but that slightly more candidates indicated transfers of capability from employment to the doctorate.

**Table 20. Respondent perceptions of capability transfer from and to employment and the doctorate (%)**

Capability/capability transfer	Employment to Doctorate <sup>1</sup>	Doctorate to Employment <sup>2</sup>	Difference in Transfer
Critical thinking	65	54	11
Information & communication technology	63	46	17
Time management	61	43	18
Problem solving	57	53	4
Working in teams	47	23	24
Writing	47	55	-8
Project management	45	33	12
Networking	42	28	14
Library	26	51	-26
Occupational health & safety	25	12	13
Ethical	19	29	-10
Other	4	6	-2

**[Note:**<sup>1</sup> N=4,432 (82 per cent of total survey population)<sup>2</sup> N=4,632 (86 per cent of total survey population)]

The data supports the contention that candidates do bring a range of useful skills into their doctorates from their current or previous work experiences and that they cannot be considered as young, inexperienced candidates lacking in work-ready attributes, as is so often portrayed in the media—as noted above survey respondents have a median age of 31 and a mean age of 35. Of particular interest, are differences greater than 10%. i.e. areas where substantially more respondents perceive the transfer between employment and doctorate, is in critical thinking, IT, time management, working in teams, project management, networking, and Occupational Health and Safety (OHS); and where more respondents perceive the transfer is from doctorate to employment for library skills and ethical research practices. Problem solving is one skill where there is agreement both ways and could indicate the need to explore further what is being assumed this term means.

There is variation in the perception of the transfer of capabilities both within and across BFOS, but little difference between capability transfer from employment to doctorate or vice versa for those undertaking a PhD by research, PhD by research and coursework, or those undertaking a professional doctorate. However, in both doctorate to employment, and employment to doctorate transfer, those without scholarships perceived higher transfer rates, in both directions, than scholarship holders. Of the eleven options provided, non-scholarship holders perceived higher transference rates in eight cases for doctorate to employment and in nine cases for employment to doctorate. This may indicate that these candidates, more of whom are part-time and in employment, more clearly identify the multi-directional nature of the skills transfer and have had more opportunities for it to occur.

**Location**

Respondents were asked to indicate the locations of resources (such as, IT equipment, experimental equipment, materials and information resources) used for their doctoral research and frequency of use.

**Table 21. Location and frequency of infrastructure used for research**

Infrastructure/Frequency of use	Never (%)	Rarely/sometimes (%)	Mostly/always (%)
University	3	24	74
Home	9	43	49
Employer <sup>1</sup>	47	18	13
External research agency <sup>2</sup>	45	23	10
Industry partner <sup>3</sup>	56	15	4

[Note: 599 indicated 'other' infrastructure used, but not specified.

<sup>1</sup> N=4170, 77 % of survey population

<sup>2</sup> N=4196, 78% of survey population

<sup>3</sup> N= 4065, 75 % of survey population]

The responses in Table 21 above align with the rank order of Table 4, and suggest that such a range of locations for research and study is usual, but likely to vary over time according to the nature of the activity. Moreover, the use of a range of locations holds for all BFOS, though the patterns within each BFOS vary. For example, those candidates in BFOS Health are more likely to carry out their research in a research agency. A further indicator of the location of doctoral study and research is the reported location of the principal supervisor. The majority (85%) were reported as on campus, while those off campus were 3% at another university, 4% off campus in the public sector, 2% off campus in the private sector; and a further 3% off campus in the community.

This, however, does not provide a complete picture of communications and connections. In identifying the individuals most influencing their learning and research 18% rated an academic at another university as 'most' or 'highly influential', and 11% did likewise for an industry-based researcher. Such connections are made easy by email – 83% gave this as the most effective method for keeping in contact with the individual deemed to be most influential 'always' or 'frequently' – although 79% also indicated that they engaged in 'face-to-face' meetings, 25% used the 'telephone' and 45 respondents used 'letters'. These last two media could indicate the pattern for external supervision identified in Pearson & Ford (1997, p. 39), where supervisors use a range of communication strategies and media.

Overall we can conclude that the location of a particular candidate at a given time and their use of research infrastructure is very variable. The complexity of this is demonstrated in the case narratives that form part of the thesis completed by Cumming, who argues for the significance of recognising the particularity, as well as the complexity, of the doctoral experience (Cumming 2007).

### **Candidates' perspectives, goals and expectations**

Overall the respondents were reasonably positive about their doctoral candidature with 79% agreeing their expectations are being met to some extent. There is no significant gender difference, but those enrolled for longest are less positive, a finding consistent with previous research (Cullen et al. 1994). Across BFOS, there are also significant differences, with Education doctoral candidates being significantly less satisfied than all other BFOS with the exception of Creative Arts. Health candidates were also significantly less satisfied than respondents in the Natural and Physical Sciences (Appendix B).

Candidates viewed their candidature most commonly (44%) as 'professional development' as shown in Table 22, with those in BFOS Health ranking this

most highly (56%) and with Society and Culture least highly (32%). It is of note that there is variation within all BFOS as well as across them. Only the BFOS Health and Management and Commerce have agreement of over 50% on a view of the candidature. The range of responses raises the issue of terminology as these terms have varying meanings for doctoral candidates, their supervisors and others. The varying use of terminology reflects the differences among those involved in PhD programs as to their purposes and educational nature. Only 36 (1%) viewed their PhD as 'leisure', which some have worried might be the motivation for funded candidates in fields in less obviously employment related fields.

**Table 22. Respondents' views of the candidature (%)**

View of candidature	Respondents (%)
Professional development	44
Education	17
Knowledge production	16
Personal development	13
Training	6
Not entered	2
Leisure	1
Other	1
Total	100

Relevant to these responses are plans for the future. Next to university work as a destination (39%) the next largest group (23%) 'not sure' could apply to any type of candidate, those seeking their first job, or those looking to change (Table 23). There is a significant, but small, relationship between post-doctoral plans and gender. Men are over-represented in the private sector relative to females, (6% more) and women are over-represented in the non-profit sector (2.6%).

**Table 23. Respondents' plans for after the doctorate**

Post-doctoral plans	Respondents (%)
University	39
Not sure	23
Public sector	15
Private sector	14
Non-profit/community sector	5
Other	3
Total	100

An important additional finding, as shown in Table 24, is that 47% of those giving 'university' as their post-doctoral plan are those claiming to be an academic member staff in 2005. And conversely of the 1,609 claiming to be academics 982, (61%), planned to be employed in a university after they completed. Some however, are looking to other fields in the private and public sector, and like many others, some are 'not sure'.

**Table 24. Post-doctoral plans of those who are (not) academic staff**

Post-doctoral Plans	Main Occupation	
	Not academic (%) N=3765	Academic (%) N=1609
Non-profit/community sector	6	3
Not sure	27	14
Other	3	2
Private sector	16	10
Public sector	18	9
University	30	61

## Discussion

Although it is now common to say that doctoral candidates form a diverse population, when it comes to discussing the characteristics of the doctoral population, and aspects of doctoral education itself, it is customary to rely on the given official demographic categories such as 'part-time/full-time', 'sex', 'age', 'mode of attendance', etc. Discussion then easily follows on the needs and expectations of 'part-time', 'on campus' and 'international' candidates, and so on. The danger of this reliance on these macro categories is that any such analyses can effectively reduce, rather than capture, any representation of the extensive variation at the level of practice. These official categories are designed primarily to assist government and universities to manage their PhD income, expenditure and resources. They do not describe defined groupings that are stable, so that assumptions as to behaviour, needs and expectations cannot be made. Often the use of 'means' and 'medians' mislead people to view the doctoral population as relatively homogenous, even if different in some respects from previously. It is understood that doctoral candidates are not predominantly, young, male and on campus; but is the view that they are in their thirties, an advance in terms of understanding the extent of diversity? The range of candidates' ages tells us more about the diversity of the doctoral population, than the means and age groups often used. Similarly, the apparent growth of external study relies on acceptance that the reporting categories for mode of study reflect the reality on the ground in a useful way.

Our data suggest that although there are patterns or clusters of characteristics that can be associated with certain groupings, for example, Education candidates are more likely to have fewer parents with university education, to be part-time, external, older and female, many in Education are not like this. That is, within group differences are as important as between group differences. This is particularly the case for the use of BFOS. Although, the ASCED code has some relationship to disciplinary divisions that relationship is not strong and varies among the BFOS. BFOS are necessarily just that, broad, and can encompass a range of specialities with associated research and professional practices. An extreme case in point could be Health.

Health is a growing field that encompasses doctors, nurses and various other health professionals, as shown in Table 25. There is limited relationship to specific research practices; rather the breakdown is more occupationally based. It is noteworthy that here too, the highest number of responses are for 'Other health' which includes Nutrition and Dietetics, Human Movement, Paramedical Studies, First Aid and the catch-all 'Health, n.e.c. (not elsewhere classified)'. A

further confounding factor is that much medical research is carried out in multidisciplinary teams in biomedical research centres.

**Table 25. Distribution of respondents in narrow fields within BFOS Health**

Study Field	No. of Respondents	Study Field	No. of Respondents
Medical Studies	265	Nursing	85
Pharmacy	36	Dental Studies	16
Optical Science	10	Veterinary Studies	16
Public Health	195	Radiography	11
Rehabilitation Therapies	76	Complementary Therapies	18
Other Health	328		

A feature of the survey responses is the frequent use of the category 'other' and many respondents took advantage of the opportunity to specify when offered as shown in Tables 8, 12, 16. Providing respondents with the option of 'other, please specify' for a number of survey items enabled us to gain a more nuanced view of activity and the range of practices current. The result confirms that the degree of particularity associated with doctoral activity, academic activity and scholarships is considerable. This is not surprising as many doctoral candidates are working at the 'cutting-edge' of thinking and research, and some are using their doctoral program to resource and advance specific interests that precede their enrolment.

An improvement may be to develop more robust categories, but this, too, is problematic. For example, one possibility is to use the revised RFCD code - the Australian and New Zealand Standard Research Classification 2008 (ANZSRC), which is more closely aligned with disciplinary groups. However, as Pearson et al (2008) argue there are problems here, especially as the code does not cope well with inter-disciplinary/multi-disciplinary activity in which doctoral candidates may be engaged. Moreover, what stands out from these survey analyses is that the variation does not consist of subsets of macro-categories. Ryland (2007) and Cumming (2007) position candidates as people with multiple responsibilities, goals and expectations which reach beyond the academy. As discussed by Välimaa (1998) academics too interact with and belong to a number of reference groups which can include discipline-based communities (national and international colleagues), professional communities (institutional or national) institutional level communities (professional colleagues from other departments), and national culture (friends and relatives). On different issues Välimaa (1998) suggests academics will identify with different reference groups revealing a more open situation than that suggested by a focus on disciplinary differences. The doctoral population and their experience are complex and particular: in a sense they are not singularly categorisable beyond a basic level of utility; most practitioners in doctoral education would require complex, even fluid, categorisations in order to inform their policies and practices.

The issue remains as how best to represent the doctoral population in all its diversity, complexity and particularity. Sen (2006), in discussing the need for recognising multiple identities, argues against the reduction of people and individuals to groups, to ethnic or religious identities alone. He sees this as making them open to being persuaded to engage in sectarian and ethnic violence. Instead, he argues for an acknowledgement that we have multiple identities, and proposes an alternative perspective for this, that is we are

'diversely different'. This concept is one that recognises difference without attributing group affiliation, without seeing the particularities of difference as all encompassing and unchangeable, and without lapsing into notions of difference as 'deficit'. Most importantly, it allows people to choose how to allocate relative importance to their multiple identities, choices which may change overtime.

This approach is one that concurs with the nature of the diversity revealed by the survey data and analyses. Its appropriateness is confirmed by the further qualitative research undertaken by Ryland (2007) and Cumming (2007). The implications are not to assume anything on the basis of enrolment status, disciplinary affiliation, gender, and so on, but be open to each candidate in their particular context negotiating their particular doctoral path. Issues as to institutional quality, curriculum and research education climate then need to be addressed flexibly with due recognition of the complexities of the '...multiple small worlds of research training with their specific research and research training practices' (Enders, 2004, p. 427), and we would add the diversely different doctoral candidates within them.

## Conclusions

Attempts to represent the doctoral experience within standard categories ignores the extent and nature of individual variation. Such attempts unhelpfully contribute to the trend to the bureaucratisation of doctoral education whereby Kendall (2002, p. 137) argues academics and doctoral candidates are rendered '... transparent, accountable, standardised, observable.' In part, this bureaucratisation is a response to the challenges of the massification of doctoral education, in part a response to the supposed connection to economic growth, but it also is a scaling up of management approaches from the undergraduate arena. In so doing, there is a denial of the role of the agency of those involved in doctoral research. We need statistics to monitor issues such as equity and funding, but we should not rely on them uncritically for research purposes, certainly not to understand and represent the experience of doctoral education.

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## References

- Australian Bureau of Statistics & Statistics New Zealand (2008). 1297.0 - Australian and New Zealand Standard Research Classification (ANZSRC). Canberra.
- Australian Bureau of Statistics (2001). 1272.0 - Australian Standard Classification of Education (ASCED). Canberra.
- Craswell, G. (2007). Deconstructing the skills training debate in doctoral education. *Higher Education Research & Development*, 26(4), 377-391.
- Cullen, D.J., Pearson, M., Saha, L.J., & Spear, R.H. (1994). *Establishing Effective PhD Supervision*. Canberra: Department of Employment, Education, Training and Youth Affairs, Evaluation and Investigations Program.
- Cumming, J. (2007). *Representing the Complexity, Diversity and Particularity of the Doctoral Enterprise in Australia*, Centre for Educational Development

- and Academic Methods, PhD Thesis. Canberra: The Australian National University.
- Department of Employment, Education and Workplace Relations (DEEWR), Higher Education Statistics. Accessed May 2008, [http://www.dest.gov.au/sectors/higher\\_education/publications\\_resources/statistics/selected\\_higher\\_education\\_statistics/previous\\_years.htm](http://www.dest.gov.au/sectors/higher_education/publications_resources/statistics/selected_higher_education_statistics/previous_years.htm)
- Enders, J. (2004). Research training and careers in transition: A European perspective on the many faces of the PhD. *Studies in Continuing Education*, 26(3), 419-429.
- Evans, T. D (2002). Part-time research students are they producing knowledge where it counts? *Journal of Higher Education and Research and Development*, 21(2), pp. 155-165.
- Kendall, G. (2002). The crisis in doctoral education: a sociological diagnosis. *Higher Education Research & Development*, 21(3), pp. 131-141.
- Neumann, R. (2003). *The Doctoral Education Experience*. Canberra: Department of Education, Science and Training.
- Neumann, R., Kiley, M., & Mullins, G. (2007, 23-26 September). *Employment Outcomes of Australian Doctoral Graduates*. Paper presented at the Tertiary Education Management Conference, Canberra, Australia.
- Pearson, M., Evans, T. & Macauley, P. (2008). Growth and diversity in doctoral education: assessing the Australian experience. *Higher Education*, 55(3), pp. 357-372.
- Pearson, M. & Ford, L. (1997). *Open and Flexible PhD Study and Research*. Canberra: Department of Employment, Education, Training and Youth Affairs, Evaluation and Investigations Program.
- Ross, K. (2001). *First Year Postgraduate Students at the University of Melbourne: A preliminary investigation*. Melbourne: University of Melbourne.
- Ryland, K. (2007). *Reconceptualising the Australian doctoral experience: work, creativity and part-time study*, Faculty of Education, PhD Thesis, Deakin University, Geelong.
- Sen, A. (2006). *Identity and Violence: The Illusion of Destiny*, W.W. Norton, USA, Penguin Books UK, and India.
- Thompson, J., Pearson, M., Akerlind, G., Hooper, J. & Mazur (2001). *Postdoctoral training and employment outcomes* (Canberra, Department of Employment, Education, Science and Training, Evaluation and Investigations Program).
- Välilmaa, J. (1998). Culture and Identity in Higher Education Research. *Higher Education*, 36, pp. 119-138.

## Appendix A

**Table (Ai). A comparison of the 2005 doctoral national and survey profiles on key demographics**

The 2005 national profile (%) N=40794		2005 Survey (%) N=5395
50	female	62
62	full time enrolment <sup>1</sup>	70
91	mode of attendance 'internal'	79

<sup>1</sup>This figure is based on data analysed by Ryland (2007, p. 67).

**Table (Aii). Age of candidates 2005 nationally and for survey population**

Age groups	National (%) (n=40794)	Survey (%) (n=5395)
20 to 29	36	44
30 to 39	29	26
40 to 49	22	18
50 to 59	11	10
Over 60	3	2

**Table (Aiii). The distribution of 2005 doctoral candidates nationally and in the survey across BFOS**

Broad Fields Of Study	National (%)	Survey (%)
Agriculture, Environmental and Related Studies	4	6
Architecture and Building	1	1
Creative Arts	4	4
Education	9	8
Engineering and Related Technologies	10	6
Health	12	20
Information Technology	4	5
Management and Commerce	10	6
Natural and Physical Sciences	20	20
Society and Culture	26	24

## Appendix B

**Table (Bi) Extent to which expectations are being met for doctorate across BFOS**

<b>'Broad Fields Of Study'</b>	<b>Mean</b>	<b>N</b>	<b>Std. Deviation</b>
<b>Agriculture, Environmental and related studies</b>	2.99	326	.977
<b>Architecture and Building</b>	2.67	36	.793
<b>Creative Arts</b>	2.82	190	1.004
<b>Education</b>	2.64	402	.921
<b>Engineering and Related Technologies</b>	2.91	341	.959
<b>Health</b>	2.84	1076	.917
<b>Information Technology</b>	2.91	247	.973
<b>Management and Commerce</b>	2.88	345	1.028
<b>Natural and Physical Sciences</b>	2.97	1084	.883
<b>Society and Culture</b>	2.89	1273	.950
<b>All Respondents</b>	2.88	5327	.941

**[Note:** Each BFOS was compared to each BFOS (e.g., A vs. B, A vs C, etc.) after an overall significant difference was found using an Analysis of Variance to ensure reliability.]

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