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PhD Student Satisfaction with Course Experience and Supervision in Two Australian Research-intensive Universities

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ABSTRACT *Over the past decade, Australian universities have experienced a dramatic expansion in PhD enrolments and in the proportion of female PhD candidates. This article assesses how well two major research-intensive universities have coped with these changes, looking particularly at student course experience. Of particular concern are relatively low satisfaction ratings given by PhD students to their overall course experience, which appeared to stem largely from dissatisfaction with supervision. Females were decidedly more dissatisfied than males with both course experience and supervision. In turn, dissatisfaction with supervision by both male and female students appears to have stemmed from various factors, but particularly important were lack of easy access by students to supervisors because of high workloads, and weaknesses in supervision practice. Many younger PhD students had distinctively negative attitudes towards universities and academic careers at a time of declining government funding per student unit.*

Keywords: PhD enrolments, course experience, supervision, student satisfaction, access to supervisors, part-time students, high academic workloads.

Introduction

By focusing on student satisfaction with course experience and supervision, this article attempts to assess how well major Australian research universities have coped with recent rapid expansion in PhD enrolments at a time of declining financial resources per student unit. It also seeks to assess how well universities have adjusted to substantially larger proportions of female PhD candidates. Over the past decade, Australian universities have seen unprecedented expansion in PhD enrolments and substantial increases in female participation in PhD programmes. Between 1990 and 2000, total PhD enrolments increased from 9,298 students to 27,996 students while the proportion of female students increased from 35 to 47%. Over the same period, Commonwealth (Australian) Government operating grant funding to universities per student unit declined appreciably, resulting in significant deterioration in staff:student ratios nationally from 1:14 in 1990 to almost 1:20 in 2001. In

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addition, new political pressures require research students to complete their degrees in minimum time and expect universities to develop broader skills sets for the future employment of PhD students, which is increasingly likely to be outside universities.

In recent years, expansion of PhD enrolments has had a high national priority in Australia as in other OECD countries. As Clark[1] has observed, the importance of research training and PhD courses now goes well beyond the academy. Modern industrial nations generally are concerned to substantially increase their scientific capabilities as science and technology become increasingly linked to economic growth and international competitiveness. PhD enrolments thus represent a substantial investment for both governments and universities. In Australia in the year 2000, the Commonwealth Government allocated some $545 million within university operating grant funding to support the training of postgraduate research students (mainly enrolled in PhD courses), with a further $94 million being allocated to fund Australian Postgraduate Awards and International Postgraduate Scholarships. The size of this financial commitment raises important issues about the rate of recent expansion in PhD enrolments and the possible effects that major reductions in Commonwealth operating grants to universities have had on the Commonwealth's significant investment in PhD training and more generally in R&D. While operating grant funding has declined appreciably, the Commonwealth has increased investment in R&D substantially, particularly in its $3 billion programme in *Backing Australia's Ability*.[2]

Background, Methodology and Survey Sample

The PhD course was introduced into Australian universities immediately after the Second World War, following the British model based on preparation of a major thesis under supervision and its examination entirely or largely by external examiners. Until the 1960s, enrolments remained relatively small, largely because of limited research funding and scholarship support, and the requirements in most universities that, except for university staff, all PhD candidates had to be enrolled on a full-time basis. But with increased funding for research and the provision of postgraduate scholarships, an increased output of graduates qualified for PhD enrolment, and more flexible student entry and enrolment provisions, PhD numbers then increased relatively quickly. Total enrolments grew from just under 5,000 in 1975 to 7,625 in 1985 and to 9,298 in 1990. However, since 1990 PhD numbers have increased three-fold. While the rate of recent expansion has been highest in new universities, well-established universities have seen increases of about 250%.

Evidence available to date about how well Australian universities have coped with recent rapid expansion in PhD numbers is somewhat contradictory, especially with regard to student satisfaction with total course experience and with supervision. For example, an Australian National University study conducted in 1991–93 reported student satisfaction to be higher than in previous studies at that university (85% reporting satisfactory or better supervision and only about 5% bad or disastrous supervision)[3] while a recent study based on data from University of Queensland students who had submitted PhD theses for examination found that about 85% of respondents expressed satisfaction with supervision.[4]

On the other hand, in two studies conducted in 1993 and 1995 of students holding Australian Postgraduate Awards, Powles[5] found relatively low satisfaction

rates for PhD candidature of about 60% on average over a range of items, while a survey of international students as part of a review of the Overseas Postgraduate Research Scholarships Scheme by Grigg[6] found similar results. Using a modified version of the questionnaire developed by Powles, Grigg found that on a five point scale ranging from very satisfied to very dissatisfied on a number of different key measures regarding supervision, only between 60 and 70% of respondents reported that they were satisfied or very satisfied, while between 10 and 15% reported being dissatisfied or very dissatisfied. For example, on the item of availability of supervisor when needed, 69.5% of Grigg's respondents said they were satisfied or very satisfied, 12.8% were dissatisfied or very dissatisfied, and 17.8% were neutral. On the item on guidance on topic definition, 63.3% said they were satisfied or very satisfied, 13.9% were dissatisfied or very dissatisfied and 22.8% were neutral.[7]

Soon after Grigg's study a 1996 review of students holding Australian Postgraduate Research Awards carried out by Baker, Robertson and Toguchi[8] again produced similar findings about student dissatisfaction with supervision. While the majority of students surveyed by Baker and colleagues were quite satisfied with supervision, a significant minority reported problems. This prompted further concern in the Commonwealth Department of Employment, Education and Training, particularly in view of emerging evidence about relatively low PhD completion rates that eventually was published in 2001 after considerable delay.[9] This evidence together with other information prompted the Ministerial Green Paper issued by Minister David Kemp in 1999 to comment as follows:

> There have been persistent concerns expressed regarding the lack of breadth of research training and the quality of supervision. Both employers and students have expressed concern about the outcomes of postgraduate research training. The evaluation of the 1990 postgraduate cohort under the Australian Postgraduate Research Award Scheme found a level of dissatisfaction with both supervision and departmental support. The West Committee found strong anecdotal evidence to suggest that the quality of supervision for research students was highly variable.[10]

Concern about the quality and effectiveness of supervision has also prompted demands for more explicit skills formation in research training from a variety of stakeholders including industry and employer groups, student associations and academics. According to Pearson and Brew, supervision has become a matter of providing high quality research training environments for the student, which includes access to resources including expertise, flexibility and choice of learning environment and research conditions, opportunity for engagement with practising researchers and outside experts, and responsiveness to community career goals.[11]

Further still, comparison of data produced from a number of studies in the 1990s with the 1982 review of Commonwealth Postgraduate Awards Scheme conducted by Hill, Johnston and Smith[12] led a number of observers to conclude that student dissatisfaction amongst PhD students had increased appreciably since the early 1980s. The research methods used by Hill and colleagues do not allow direct comparison of data with that from the various studies of the 1990s which generally used five point scales, combining the two top ratings to give a percentage rate of respondents satisfied or very satisfied. However, the 1982 data certainly suggest a high rate of satisfaction with the contribution of the supervisor, especially in establishing a research framework, contributing ideas, evaluating the directions

of the research, directing the student to research literature, and developing research techniques.[13]

The limited Australian research on the recent comparative experience of male and female PhD students is more consistent. In a study of 250 Australian graduates holding postgraduate awards and in employment, Collins[14] in 1994 reported that women respondents reported less positive supervision experiences than men, while in a follow-up study of a group of Australian PhD graduates who entered academic employment Asmar[15] found that the departmental environment during PhD candidature had been overall more satisfying for men than women. In this latter study, men were much less likely than women to report experiences of social isolation or discrimination, and were more likely to have had informal intellectual discussions with colleagues.

Data for this article come from two major 'Group of Eight' (Go8) universities located in major east coast cities. With the assistance of senior management and PhD offices in both universities, questionnaires were distributed in the second half of 2000 by mail to all enrolled PhD students. A total of 1,531 usable questionnaires were returned, giving a response rate of 41%. Because of administrative difficulties associated with being required to mail to students through university PhD offices and the large PhD populations involved, it was decided not to attempt follow-up mailings. However, the usable responses appear to provide a reasonable balance by discipline and age, although female students tend to be over-represented and full-time on-campus students are considerably better represented than part-time and off-campus students. In May–June 2001, follow-up interviews were conducted in both universities with some 100 students. Students were approached through heads of departments and/or postgraduate coordinators, with some 20 departments in each university being approached. Some departments were much more successful than others in arranging interviews. However, overall an appropriate balance of interviewees was achieved between science and non-science disciplines, although it proved extremely difficult to contact part-time and mature aged students.

Table 1 provides summary information on the survey population by gender. It will be noted that some 54% of respondents were women, compared with a national proportion of slightly under 50% female PhD students. Overall there was a high degree of similarity between male and female PhD students in the survey population, although a higher proportion of females were Australian citizens or permanent residents (reflecting a high proportion of males amongst international PhD students) and females were more likely than males to have completed their former qualifications at the same university and to have part-time or casual employment, but less likely to be in full-time employment.

PhD Student Course Experience

Course experience is of major importance in assessing the success of major Australian research universities in coping with recent expansion and in producing graduates with appropriate skills looking forward to a research career. It is also important in assessing how well universities have coped with a changing student population, especially in terms of gender. Unsatisfactory or lowly rated course experience presumably indicates that academic departments have been less than successful in offering rich PhD training and research experiences, while dissatisfaction with course experience presumably is likely to have an adverse impact on career plans and interest in pursuing a research career.

Table 1. Social and educational backgrounds, enrolment, hours spent in PhD research, employment, and financial support (%)

	Male *N* = 684	**Female** *N* = 850	**Total** *N* = 1,534
Age			
Under 30	38.2	43.6	41.1
30–39 years	36.0	31.0	33.3
40–49 years	15.8	18.3	17.2
50 years and over	9.9	7.0	8.3
Citizen status			
Australian citizen/permanent resident	84.9	92.7	89.2
International student	15.5	7.2	11.0
Educational background/language			
Completed all degrees at current institution	28.8	34.0	31.6
First language English	71.7	82.5	77.5
Enrolment status			
Full-time	69.2	70.9	70.1
Part-time on campus	19.2	20.7	20.0
Part-time off campus	11.5	8.4	9.8
Hours per week spent in PhD research			
Less than 10 hours	11.7	11.2	11.4
10–19 hours	15.2	16.7	16.0
20–29 hours	12.8	13.0	12.9
30–39 hours	19.0	22.6	20.9
40–49 hours	22.2	23.8	23.1
50 hours and over	19.1	12.7	15.6
Employment			
Full-time employment	26.4	19.0	22.4
Part-time/casual employment	42.2	51.2	48.0
Scholarships			
APA with stipend	23.0	30.5	27.1
University scholarship	19.1	19.6	19.4
Other scholarship	23.8	17.8	20.6
No scholarship	34.1	32.0	33.0
Gross income for last financial year			
Less than $15,000	13.5	12.7	13.1
$15,000–$19,999	21.1	26.0	23.7
$20,000–$24,999	17.8	23.3	20.8
$25,000–$39,999	18.9	16.9	17.8
$40,000 and over	29.7	21.1	24.6

The survey research collected considerable data about course experience. First, respondents were asked about whether they had one or more supervisors. About 35% of full-time students had only one supervisor compared with 51% full-time students holding Australian Postgraduate Awards found by Baker[16] and colleagues some four years earlier. This suggests that by 2000 the appointment of two or more supervisors had become increasingly common and regarded as best practice in Australian universities. However, it should be noted that 51% of part-time on-campus students in our sample and 38% of part-time off-campus students in our

sample had only one supervisor. Overall supervision of part-time students appears to be far less effective than supervision of full-time students.

Second, respondents were asked about interaction with their supervisor or supervisors. About 39% reported consulting their supervisor at least once a week, 37% at least every two or three weeks, 21% every month or two, and the rest infrequently or irregularly. These data provide a more satisfactory picture than in that reported in the review of Australian Postgraduate Award holders by Baker[17] and colleagues who found that 58% consulted their supervisor daily or about once a week or fortnight. This suggests that at the two universities in our study many departments were taking supervision seriously despite declining financial and staff resources.

Not surprisingly, full-time students meet more frequently with supervisors than part-time students. About one third of full-time students reported that they met with their supervisor(s) at least every week and another third meet at least every two weeks. On the other hand, about 10% of full-time students reported that they met with their supervisor(s) infrequently or irregularly. Of part-time students, about 65% report that they meet either every month or two, or infrequently or irregularly. Male students are slightly more likely than female students to meet their supervisor(s) at least weekly, but this may well be the result of a higher proportion of younger males working in laboratory-based disciplines within research teams.

Third, information was collected about the satisfaction of respondents with their course experience and especially supervision. Table 2 summarises data on the percentages of respondents who rated various aspects of their course as satisfactory and very satisfactory, and unsatisfactory and very unsatisfactory. Only about 57% rated their 'overall experience as a PhD student' as satisfactory or very satisfactory, while 13% rated the experience as being unsatisfactory or very unsatisfactory. A related item which asked students whether they would recommend the course to others produced similar results, with about 64% saying yes, 14% saying no, and the remainder saying that they were unsure.

Of perhaps even greater concern is the relatively low satisfaction rating in Table 2 of about 62% for the 'quality and effectiveness of supervision', with almost 17% giving a rating of unsatisfactory or very unsatisfactory. This is somewhat of a puzzle in view of national and institutional efforts over the past decade to address

Table 2. Satisfaction with different aspects of PhD course (%)

	Satisfactory/ Very satisfactory	**Unsatisfactory/ Very unsatisfactory**	***N***
Overall experience as PhD student	56.9	12.8	1493
Access to specialised equipment, computer etc.	52.6	17.8	1491
Working space available to PhD students	50.2	21.6	1484
Availability of library holdings and library services	69.4	8.3	1486
Quality and effectiveness of your supervision	61.6	16.9	1489
Suitability of your research topic to produce a good thesis	76.5	6.6	1489
Competence of your supervisor(s) in your area	71.7	11.3	1485
Intellectual environment of your department	59.2	16.0	1482
Interpersonal skills of your supervisor	65.9	14.7	1489
Help provided in designing your project	53.0	20.1	1487
Financial support for your research project	48.0	23.7	1486

supervision problems. National efforts have included major funded projects and workshops and seminars, while most universities have developed codes of practice for students and supervisors, run workshops and instituted new appeal and grievance procedures for students. Moreover, detailed documentation demonstrates that both universities used for the study have made major efforts to address problems of supervision. On the other hand, it is difficult not to conclude that there are weaknesses in supervision in the two universities, especially in being able to cater for larger and more diverse PhD student populations.

In Table 2 it will be noted that other items confirm the views of respondents about supervision. Interpersonal skills of the supervisor(s) received similar ratings to quality and effectiveness of supervision, although the competence of the supervisor(s) received a somewhat higher rating. Just over half the respondents rated the help that they have received in designing their project as satisfactory or very satisfactory. Library holdings and services were rated well. On the other hand, other major problem areas for many students were working space for PhD students, access to specialised equipment, and financial support for the research project.

Supervision and Gender

Two particularly important issues are whether female PhD students are more dissatisfied than male PhD students and whether female students are more satisfied when their supervisor or main supervisor is of the same gender. These issues are of considerable importance in view of the increased proportion of female PhD students while at the same time a clear majority of supervisors are still male. Evidence in the literature suggests that many university departments may be slow in adjusting to much larger numbers of female PhD students and their particular needs.

Female students clearly showed less satisfaction with their course and supervision than male students, thus confirming the results of a number of earlier studies. While about 61% of male students said they were satisfied or very satisfied with their 'overall experience as a PhD student' and about 13% said they were dissatisfied or very dissatisfied, the figures for female students showed marked differences, with only about 57% of female students saying they were satisfied or very satisfied and 14% saying they were dissatisfied or very dissatisfied. For the item, 'quality and effectiveness of your supervision', the differences between male and female respondents were more marked, with 14% of males compared with 20% of females saying that they were dissatisfied or very dissatisfied. On the other hand, similar proportions of male and female students said that they would recommend the course to others.

Table 3 summarises the data on supervision by gender of students and supervisors. What is clear is that the proportions of satisfied male and female students were higher when the supervisor was of the same gender. Note particularly that the proportion of dissatisfied female students was markedly greater when the supervisor was of a different gender (about 23% for different gender compared with 14% for the same gender). Over two decades ago Goldstein[18] found that PhD graduates who experienced same-gender supervision publish more often than PhD graduates with a supervisor of the opposite gender while on the basis of these findings Walsh[19] argued that male mentors may have negative impacts on female students.

This issue of gender relations and supervision was followed up with multivariate analysis of 11 sub-items in a question where students were asked to rate various

Table 3. Satisfaction and dissatisfaction of PhD students with quality and effectiveness of supervision, by gender of students and supervisors (%)

	Male students		Female students	
	Same gender $N = 559$	Different gender $N = 121$	Same gender $N = 274$	Different gender $N = 525$
Satisfied and very satisfied	66.2	51.2	65.7	54.0
Dissatisfied and very dissatisfied	13.1	16.6	13.9	22.6

aspects of their course experience. The most significant results, as reported in Table 4, were in rank order 'access to specialised equipment, computer etc', 'availability of library holdings and library services', and 'working space available for research students'. In each case, both male and female students with female supervisors were more dissatisfied than those with male supervisors. These results are not easy to interpret but possibly female supervisors tend to be less senior in rank with less years of independent research experience and so their students may not secure the same preferential access to working space and facilities as those students supervised by senior male academics. Female supervisors also are less likely to hold major external research grants while possibly in heavily male-dominated departments female academics may well be in strong demand and feel under pressure to accept high supervision loads.

In interviews with individual students and groups of students, attempts were made to follow-up on gender issues. While gender was not the most important issue in most discussions, certainly it was raised a number of times by female students. Women science students, for example, frequently mentioned the lack of role models amongst academic staff and problems for female students in terms of

Table 4. Multivariate analysis of student ratings of aspects of course experience, by gender of supervisor

	Supervisor of same gender	Supervisor of different gender
Access to specialised equipment, computer etc		
Male respondents	2.34	2.54
Female respondents	2.74	2.33
Univariate $F(1,1241) = 13.87$, $p = < 0.001$		
Availability of library holdings and services		
Male respondents	1.98	2.22
Female respondents	2.23	2.02
Univariate $F(1,1241) = 11.27$, $p = < 0.001$		
Working space available for research students		
Male respondents	2.43	2.59
Female respondents	2.74	2.43
Univariate $F(1,1241) = 7.55$, $p = < 0.006$		

science careers, while in a number of departments women students agreed strongly that, in an ideal world, they would prefer to have women supervisors. A number of female students complained that, in largely male-dominated departments, female PhD students frequently feel left out of social interactions and particular social activities, and that male students tend to be much more competitive, jostling for positions and resources. One impression the interviewers gained was that some women students appear to have higher expectations than male students about the student–supervisor relationships. One woman student in sociology explained that she had had a difficult time in working out the relationship with her supervisor:

> I wanted to use a psychological approach rather than from criminology. At a personal level I had unreal expectations about going off for coffee with my supervisor. However, the annual review of student progress works well and this led to me seek another supervisor.

Other research about gender and PhD study and academic careers throws some useful light on some of these issues. Work based on international comparative data by Poole and colleagues,[20] for example, has shown that in academic careers men tend to have more positive attitudes to research than women and are more likely to see the importance of resources in relation to research productivity. Findings from a study by Romanin and Over[21] of Australian academics reported that women tend to be a few years older than men when they complete their postgraduate qualifications and this may shed some light on satisfaction levels and expectations during the PhD course. On the other hand, earlier work by Over *et al.*[22] using American data on PhD graduates in psychology found that, when allowance was made for the research productivity and impact of the supervisor, women PhD candidates supervised by women published at similar rates to women supervised by men. Similarly, men supervised by men did not publish on average more often than men supervised by women.

Supervision Satisfaction and Stage of Candidature, Type of Enrolment and Hours Spent on Research

With high proportions of both male and female students indicating dissatisfaction with supervision, it is important to take further steps to identify them. In the first place, as shown in Table 5, students in their first year of candidature tended to be the most satisfied but from then on the proportion satisfied declined markedly, with the lowest levels being found with those five years or more into their course. Perhaps in the early years of their course PhD students are more idealistic and under less stress while by year three they feel under considerable pressure to complete their research and produce the thesis. Possibly in some cases in the later stages of the course supervisors may not provide as much help as expected, or perhaps their comments on drafts are seen as being too critical.

As already noted, full-time students and on-campus part-time students tend to be more satisfied than part-time off-campus students. This is not surprising since, in general, as already noted, part-time off-campus students interact less with their supervisor or supervisors. Of considerable concern is that both on-campus and off-campus part-time students show surprisingly low rates of satisfaction from their third year on—about 48% in years three–five and over five years for part-time on-campus students, and 51% for years three–five and 44% over five years for part-time

Table 5. PhD student satisfaction and dissatisfaction with the quality and effectiveness of supervision, by stage of candidature (%)

Year of course	Satisfied and very satisfied	Dissatisfied and very dissatisfied	*N*
Less than 1 year	70.6	4.2	329
1–3 years	65.2	5.0	683
3–5 years	50.6	13.0	377
5 years and more	50.0	13.2	106

off-campus students. In terms of disciplinary groups, the most satisfied students tend to be those in education and engineering and the least satisfied are those in science, health, architecture and agriculture.

Not surprisingly, course experience satisfaction appears to be closely related to hours per week spent on PhD research and frequency of meetings with supervisor or supervisors. The most satisfied full-time students are those who spend between 40 and 49 hours per week on their research and this operates for students in the humanities and social sciences (including education) as well as in engineering and science. Table 6 summarises data on course satisfaction for full-time students in relation to frequency of meeting with the supervisor or supervisors. Students who spend less time on their research and meet less frequently with their supervisor tend to be more likely to become dissatisfied but, on the other hand, students who are tending to be dissatisfied may as a result spend less time each week on research and meet with their supervisors less frequently.

Other Aspects of Supervision

Further aspects of supervision were followed up in other questionnaire items. About three quarters of respondents said that their supervisors provided good feedback on their work, while only 57% said they had been helped to develop skills in the making of research presentations. In another item, supervisors' competence in research was rated more highly than their work as supervisors. Almost 75% said

Table 6. Percentages of full-time students (domestic and international) satisfied or very satisfied with their course experience in relation to frequency of meeting with their supervisor(s)

Meeting with supervisor	Domestic	International	Total
At least once a week	71.9*	76.4*	72.9*
At least every two or three weeks	65.8*	68.5*	66.3*
Every month or so	50.5*	56.5*	50.9*
Infrequently or irregularly	31.0*	33.9*	50.0*

*Differences are statistically significant ($P = < 0.005$).

that they agreed or strongly agreed that their supervisor or main supervisor was an impressive researcher. On the other hand, about 18% agreed that changes in supervision had adversely affected their work and about the same percentage said that they were thinking of dropping out of PhD study.

Another factor that sometimes affects PhD satisfaction and completion rates is the suitability of the research topic. As indicated in Table 2, about 76% of students said that the suitability of their research topic was satisfactory or very satisfactory while only 6% said the topic was unsatisfactory.

A small number of survey respondents provided written comments on questionnaires about supervision. These comments identified various problems, including lack of specific supervisory skills, lack of interpersonal skills, lack of time available to the supervisor because of other commitments, and in some cases supervision not being taken as seriously as students would wish. One science student in the first year of study who moved from another university to accept a scholarship explained that she has:

> . . . realised that my supervisors are ever so difficult to get help from and busy with their own work—meeting the requirements the university has on them to publish etc. that I have been neglected. Hence, as much as I enjoy PhD research, and the PhD experience, to me it feels as if I were a qualified researcher (which I am not) rather than a student.

Another science-based student complained of supervision problems 'due to the limited time available by the supervisors'. She went on as follows:

> I feel that my supervisors have taken me as a student but have not been prepared to worry about the final details of the project AND my progress. Whilst I meet once a week, the interaction is very limited—especially when other phone calls seem to be more important!
>
> My experiences as a PhD student are not limited to me. Time and again I meet with PhD students who feel the same way . . . The bottom line seems to be 'kudos without the pain of responsibility'.
>
> I have two supervisors—one clinical and the other scientific. I would have to say that the supervision of my clinical leader has been extremely disappointing. Again it seems to be time commitments and a desire to just see good results and not discuss the problems that have arisen during the project.

A number of written suggestions for change were made, including compulsory training and accreditation of supervisors, clearer guidelines about the responsibilities of supervisors, supervisors needing to engage more closely with students' projects and improved monitoring of student progress.

A number of different supervision issues were specifically followed up in interviews. Many students were highly supportive of their supervisors and their course experience. Effective supervisors were praised for their enthusiasm, the time they give to students, their technical skills, and their willingness to give students appropriate independence. Some students particularly liked the freedom their supervisors give them. One student in chemical engineering commented: 'This is a good place to do a PhD. My supervisor gives me the freedom and flexibility to pursue what I want'. On the other hand, such freedom worries some international students who would prefer more direction and a more structured programme.

Some of the most satisfied PhD students were those located in CRCs (Cooperative Research Centres) or working with industry funding. CRC students generally enjoy a higher stipend scholarship level and relatively generous research project funding, and often have the advantages of working in research teams. But even some PhD students in CRCs were highly critical of the work pressures on their supervisors and the difficulty of getting access to supervisors at critical points in their work.

A proportion of interviewees expressed personal dissatisfaction with supervision. They attributed this to different factors but by far the most common complaints were that supervisors are too busy to give adequate time to PhD students when they need help. According to one female PhD student in a science faculty, 'My supervisor has too much to do. He is so thinly spread over so many tasks that he doesn't have time to spend with me'. Another female science student complained of staff being over-stretched. Other problems with supervision related to lack of supervisor interpersonal skills, different views about how the research project should be conducted, lack of supervisor interest in the topic, personality clashes and sometimes conflicting views amongst the supervisors. In the case of international students, language and cultural problems sometimes cause difficulties especially in the first year while a proportion of international students appear to find difficulty in adjusting to a more democratic and less directive style of supervision.

Because of the perceived heavy work pressures of academics and the obvious difficulties in entering the academic profession, many younger full-time students were not at all impressed with the possibility of an academic career. One young male student in chemistry said: 'When I first started, I wanted to be an academic but the more I see of my supervisor I'm not sure that I want to become an academic'. In a social science department, a female student commented: 'There is no way on God's earth that I would want to work in a university. Universities are mean in a penny-pinching way. The culture is not exactly tops'.

Other work by the author[23] has explored further the sources of the relatively low levels of course satisfaction, with simultaneous regression being used to predict satisfaction ratings for the item on 'overall experience as a PhD student' from other items. This revealed that the key factor to overall satisfaction or lack thereof was the quality of supervision. Further, the same work showed plans for research careers to be closely related to satisfaction with course experience.

Other Determinants of Course Experience

Further statistical analysis was attempted to identify other factors that affect course experience. Simultaneous multiple regression was used to predict satisfaction ratings for the item on 'overall experience as a PhD student' in relation to other aspects of course experience and candidature for full-time domestic students. The results are reported in Table 7 which provides results for predictors arranged from the most important to the least important. A significant overall regression ($F(10,1485) = 38.5$, $p < 0.001$, $R2 = 44.3\%$) identified several items uniquely contributing to the overall rating of satisfaction. What is particularly interesting is that the most significant predictors of course satisfaction were whether or not the respondent was thinking of dropping out of PhD study, their estimation of the academic strength of their department, supervision changes, the technical competence of their supervisor, and the degree of optimism about career prospects.

Table 7. Simultaneous multiple regression predicting overall experience as a PhD student

Item	Unstandardised coefficients	Standardised coefficients	*t* value
I have been thinking of dropping out of PhD study	−0.233	−0.328	−8.611***
My department is very good in its field	0.201	0.197	−5.134***
Supervision changes have adversely affected my work	−0.113	−0.168	−4.595***
My supervisor/main supervisor is an impressive researcher	0.120	0.135	3.573***
I'm optimistic about my career prospects	0.095	0.122	2.787**
I feel free to approach other academics for help with my thesis	0.057	0.069	1.774
My PhD is going to enhance my career prospects	0.0496	0.054	1.282
I feel trapped by my area of specialisation	−0.246	−0.031	−0.840

***$p < 0.001$; **$p < 0.01$.

Other analysis explored whether or not there were close relationships between course satisfaction and holding a scholarship with respect to both full-time domestic and international students using independent group *t*-tests. The results are reported in Table 8 which shows that, while there is no difference in overall satisfaction ratings between scholarship holders and non-scholarship holders for full-time international students, there was a marginally significant difference for full-time domestic students, with non-scholarship holders giving a higher dissatisfaction rating of course experience than scholarship holders. However, using Spearman's correlation because of the severe skewness on the income variable, no relationship was found between income level and overall course satisfaction.

Conclusions

The findings from this study raise important issues about how well the two universities have coped with the rapid expansion in PhD enrolments and a much higher proportion of female PhD students. They question how well academic departments have adjusted to providing supervision for larger and more diverse student populations and about the success of the two universities in their efforts to improve the quality and effectiveness of supervision at a time when there are new political pressures on research students to complete their degrees in minimum time and develop a broader skill set for future employment.

Table 8. Comparison of full-time students with and without scholarships

		Mean (sd)	*N*	Sig.
Full-time international	No scholarship	2.35 (0.775)	23	
	With scholarship	2.18 (0.813)	138	$p = 0.361$
Full-time domestic	No scholarship	2.53 (1.02)	109	
	With scholarship	2.32 (0.924)	778	$p = 0.026$

Two main overall conclusions can be drawn from the study. The first is that, despite considerable efforts by the two universities to improve supervision practices, enhance infrastructure and support for students, and develop new policies and procedures and reporting requirements for PhD study, there is reason to doubt how well academic departments have adjusted to increased numbers and diversity in PhD student enrolments. Second, major declines in funding levels and deteriorating staff:student ratios appear to be having a serious affect on academic workloads, with the result that many supervisors have decreasing amounts of time to give to their PhD students. This in turn appears to have contributed significantly to student dissatisfaction with course experience, especially supervision.

In both universities, satisfaction with the overall PhD course experience was found to be alarmingly low, with only about 57% of respondents saying they found their course experience to be satisfactory or very satisfactory and almost 13% saying it was unsatisfactory or very unsatisfactory. Relatively low rates of satisfaction were given also for the quality and effectiveness of supervision, financial support for the research project, working space available to PhD students, access to specialised equipment including computers, help in designing the research project, and the intellectual environment of the department. The low ratings given to the quality and effectiveness of supervision are of particular concern, especially since the mode of teaching is staff intensive, with each student interacting directly with one or two supervisors. Low satisfaction with course experience also appears to have adverse effects on career directions, especially preference for research careers.

Female students were decidedly more dissatisfied than male students, especially with their overall course experience and the quality and effectiveness of supervision. This may be related to problems of female students being supervised by males, to female supervisors being overloaded and possibly to higher expectations concerning supervisory relationships on the part of female PhD students. Both male and female students tended to be more satisfied when the supervisor or main supervisor was of the same gender, with the rate of dissatisfaction of female students being significantly higher when the supervisor or main supervisor was male. This issue was followed up with multivariate analysis which showed that the most significant discriminating items for both male and female students with female supervisors related to infrastructure items—access to specialised equipment, availability of library holdings and library services, and working space for research students. This finding is not easy to interpret but possibly it can be attributed to female supervisors generally, especially in science departments, being less senior than male supervisors, having less years of research experience, being less likely to hold major external research grants and having less easy access to research facilities.

Student dissatisfaction with supervision for all students appeared to increase during the course, with higher rates of dissatisfaction being found from year three on. Part-time students tended to show considerably greater dissatisfaction than full-time students. On the other hand, not surprisingly, those students more satisfied with their supervision tended to be those who interacted more frequently with their supervisor or supervisors, and who spent more time per week on their research.

Interviews followed up on issues related to supervision and largely confirmed the results from the survey research. Problems in supervision reported in discussions related to lack of specific skills in supervision and poor interpersonal skills, but surprisingly by far one of the strongest complaints was that even highly competent supervisors were often too busy to give adequate time to students

because of their heavy workloads. Associated with this amongst many younger full-time students, especially in science and technology fields, were strongly negative views towards universities in the current funding environment and towards the academic profession.

The findings have important implications for both national higher education and R&D policy, and for university management. At the national level, major reductions in university funding undoubtedly have put considerable additional work strains on academic staff, so much so that the quality and effectiveness of supervision are being adversely affected, especially by reducing the time available for supervision by highly successful academics with a dozen or more research students, externally-funded research projects and heavy teaching commitments. In these circumstances, it seems reasonable to suggest that reductions in core operating grant funding per student unit may be jeopardising the current Commonwealth Government's substantial R&D investment, especially in *Backing Australia's Ability*. But it is important to emphasise that funding reductions alone do not explain the serious levels of student dissatisfaction.

Another important national policy issue relates to whether the growth rate in PhD enrolments over the past decade has been too rapid and whether, in fact, Australia can, and should, sustain such growth rates into the future, especially in view of the current levels of student dissatisfaction with their course experience. Since the late 1980s, the Commonwealth Government has done relatively little to restrict PhD growth rates, leaving decisions about PhD enrolment essentially to individual universities, under a 'steering' from a distance approach rather than employing detailed regulation. Within universities some argue that there is no reason for concern about the rapid increase in PhD enrolments since the PhD course provides admirable training for a wide range of different professions. While high level research training no doubt develops a range of skills useful in many professions, there is the important question of whether or not the Commonwealth should continue to meet the considerable costs involved in providing specialised training for increasing numbers of PhD students, many of whom are unlikely to enter research or academic careers.

At institutional level, the findings suggest that, while the two universities may have made substantial and worthwhile efforts to enhance supervision and the research environment for students, certainly more needs to be done to address issues of student dissatisfaction, particularly related to supervision. Certainly dual supervisors appear to have become increasingly common and students appear to meet more frequently with supervisors than the level of interaction reported in earlier studies during the 1990s. But there are major issues that need attention concerning the effectiveness and quality of supervision and the provision of high quality learning environments to meet student needs and preferences with regard to learning environments and research conditions. Useful suggestions made in the literature provide possible strategies for further improvements in supervisory practice.[24]

Another important institutional issue relates to resource levels within departments and control over PhD student numbers. To sustain current numbers of PhD students, additional financial resources need to be found in order to provide increased support to PhD students and provide more time for supervisors to interact with their students. In strong departments with large numbers of PhD students, possibly upper limits should be placed on PhD enrolments. In interviews with senior staff in both universities, it was acknowledged that in some departments

supervisory loads already may have reached reasonable upper limits, with senior staff having little or no additional capacity to take further students.

Gender issues clearly need more attention particularly in those departments with relatively small numbers of female academics and growing numbers of female PhD students. Possibly more could be done to address gender supervision issues more directly within departments, where possible seeking student preferences with regard to supervision. More possibly could be done to sensitise heads of departments and supervisors to issues related to female PhD students, especially those female students located in heavily male dominated departments.

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