

Department of Employment, Education and Training.

ESTABLISHING EFFECTIVE PhD SUPERVISION

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Part I

Introduction

Themes and Methodology

Almost ten years ago, Rudd commented that ‘research into postgraduate education that has made any significant contribution is somewhat sparse’ (Rudd, 1984, p. 109). Although there have been many studies of Australian and overseas graduate education since then, there is still dissatisfaction with supervision expressed by students and supervisors and concerns about continuing long completion times of students.¹ Some of the difficulty may be because not enough heed has been taken of the advice of Moses that ‘All that we need now is to implement what has already been realised as good practice!’ (Moses, 1993, p. 49). This report addresses the continuing dissatisfaction by attempting a reframing of the issues to encourage the rethinking of practice. In attempting such a reframing, this report seeks:

- to explore the interaction over time of varying factors in supervisory practice and particularly to distinguish between what is common and what is particular across disciplines; and
- to avoid concentration upon the individual relationships which obtain between students and supervisors by locating that relationship in a broad context and enabling thereby the identification of strategies independent of, or moderating, individual differences.

The Components of the Project

The initial objectives of the project were:

- to examine the roles, mutual responsibilities and expectations of supervisors and PhD students within the institutional context of administrative and academic demands and within the context of the management and support services available through the Graduate School of the Australian National University;
- to identify the critical elements of supervisory practice in terms of how it is managed, interactions of staff and students, progress over time, and strategies that lead to successful outcomes; and
- to explore the nature of effective supervisory practice as it relates to the varying characteristics and needs of students from Australia and overseas by gender and across disciplinary groups.

The Study Site

The current study was conducted at the Australian National University where distinctive management and support structures have been put in place under the aegis of the recently established Graduate School. A brief outline of the history and operation of the ANU's Graduate School is provided in Appendix A. The management and support structures of the Graduate School are examples of more systemic approaches to supervision and include arrangements which ensure:

- that all students are supervised by a panel of at least three individuals—one or more of whom are 'supervisors', with the other members being 'advisers'—the chairperson of the panel must be a supervisor.
- that significant responsibility for the oversight of the student's progress and broader academic development rests with, and is recognised by the University to reside with, individuals other than members of the student's supervisory panel—for example, the Convenor of the student's Graduate Program, the Head of the student's Department, the Dean of the student's Faculty or the Head of the student's Research School, the Dean of the Graduate School, etc; and
- that graduate education is organised outside the traditional academic faculty and department structures of the University—through the Graduate School and its Programs.

Although the report's findings come from the ANU experience, the nature of the investigation ensures that they are transferable to other institutions. The Australian National University is a particularly appropriate site for this study. The student population is diverse: in 1992 there were some 772 PhD students at the ANU and of these, 279 students (36%) were female, 89 students (12%) were part-time and 302 students (39%) were from overseas (Australian National University, 1993); and involves students, at the graduate level, in The

Faculties (a research and teaching institution) and the Institute of Advanced Studies (a research only institution). The internal diversity of the institutional components of the ANU has encouraged diverse responses to organising Graduate Programs.

Research Strategies of the Studies

The project has been aided by the useful background to the current investigation provided by the substantial amount of research into graduate education which has already been undertaken at the ANU. In particular, the project has been guided by the studies of research students' experiences of supervision undertaken by the ANU Postgraduate and Research Students' Association (Cullen, 1989); and the studies of the experiences of supervisors with overseas students undertaken by the University's Study Skills Centre (Ballard and Clanchy, 1993). The current report and its underlying studies continued, more fully and systematically, the approach adopted by these earlier studies of viewing and analysing supervision practice from both staff and student perspectives.

In designing the studies which underlie this report the authors adopted Powles' suggestion that, in order to provide guidelines and help define 'good' or 'successful' supervision, studies of supervisory practice should be based on both longitudinal studies and intensive interviews with supervisors and students (Powles, 1988b, especially pp. 91–2). The report also draws on the useful frameworks of analysis for research on graduate supervision provided by the body of experience that has developed in the field of independent learning for adults and the principles of supervision in management.

The discipline based analysis used in the report is particularly important in that it facilitates cross-institutional comparison. In the higher education system in Australia at this time there is a very diverse array of academic administrative structures. Any analysis based on such structures is problematic. A Faculty of Arts in one institution, for example, comprises different departments from that in another. Many institutions have also moved to school structures which make comparison across departments difficult. A standard method now adopted in education research to overcome these and other difficulties is to examine well-defined clusters of disciplines which share epistemological and methodological concerns (Becher, 1989). The five clusters of disciplines used in this report are outlined in Figure 1.1.

The basis for the allocation of disciplines into clusters and the details of the typology adopted in this report are included in Appendix B to enable readers to make their own judgements as to which comparisons are useful for them.

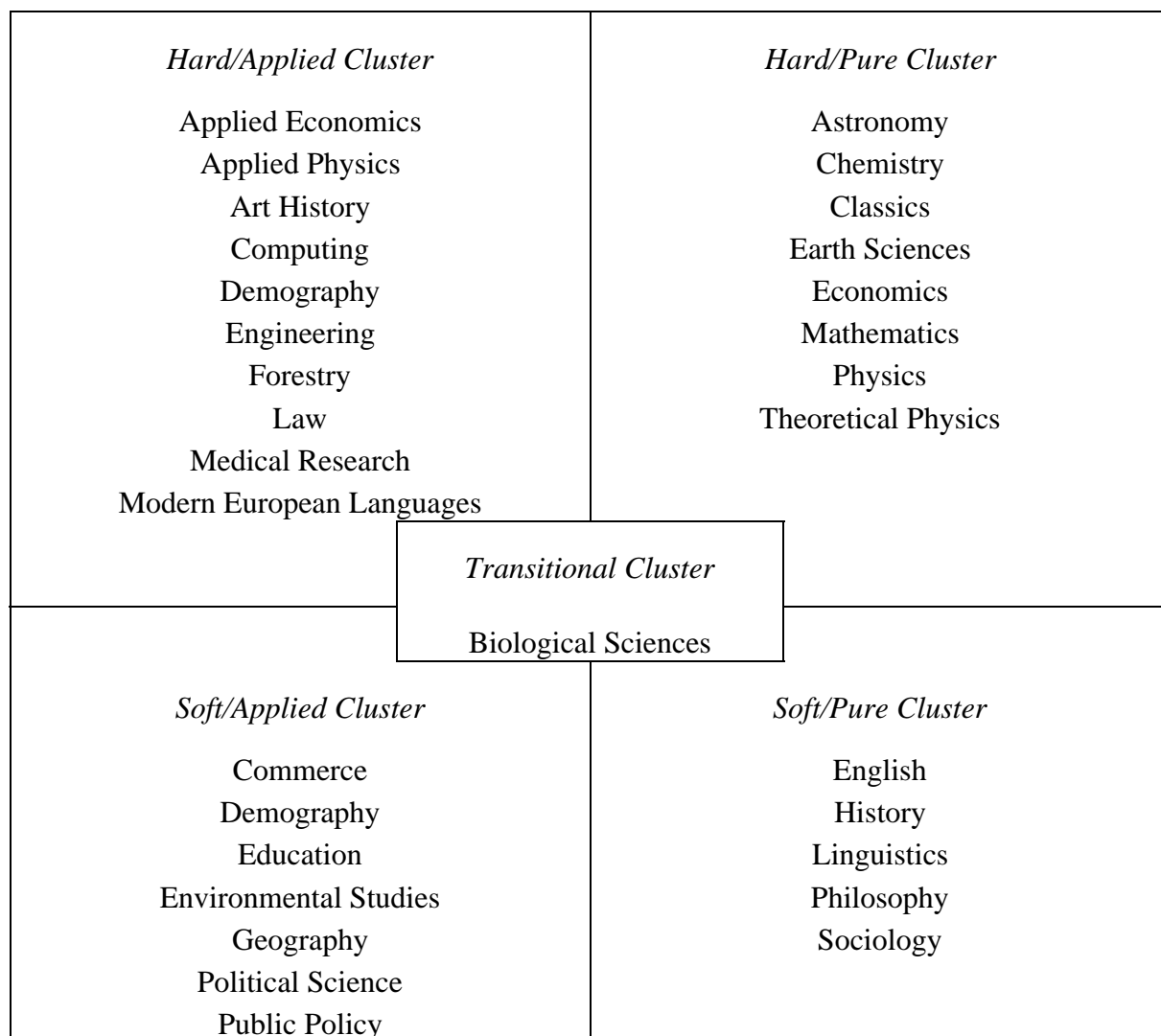
The report is based on a number of research strategies. These include a longitudinal study of the progress of a selected sample of PhD students; interviews with selected groups of experienced staff and recent students concerning practice and supervisory styles; and

questionnaire surveys of all PhD students and of all academic staff involved in PhD supervision at the ANU which investigated the extent of variation in practice and the impact of the institutional and disciplinary structures.

The Longitudinal Study

The longitudinal study was of eight PhD students who were followed by regular interviews and self-report mechanisms during the initial stage of the study. Besides a diary, students were asked to complete a weekly questionnaire. A sample copy of the weekly questionnaire is contained in Appendix C. Two of the students were from the Hard/Pure discipline cluster, one was from the Hard/Applied discipline cluster, two were from the Transitional discipline cluster, one was from the Soft/Applied discipline cluster and two were from the Soft/Pure discipline cluster. Half of the students were women. Longitudinal studies are notoriously difficult to control and carry out. This component of the project, however, allowed the study to obtain some data concerning critical elements in the supervisory partnership and patterns of interactions.

Figure 1.1: Discipline Clusters used in the Report



Interviews with Experienced Supervisors

A small group of more experienced supervisors (sixteen in total), stratified according to gender and membership of the five discipline clusters, were interviewed in depth individually about their experience and practice in order to investigate disciplinary differences in various high quality supervisory styles. Important criteria in selecting experienced supervisors were that they:

- had supervised for a considerable period of time;
- had supervised a reasonable number of students;
- saw supervision as an important part of their role;
- were a ‘successful’ supervisor, in particular had supervised few failures.

The interviewees were drawn from all levels of the academic profession and included Professors, a Senior Officer of the University, Program Convenors and Heads of

Departments. Five of the supervisors were from the Hard/Pure discipline cluster, four were from the Hard/Applied discipline cluster, two were from the Transitional discipline cluster, three were from the Soft/Applied discipline cluster and two were from the Soft/Pure discipline cluster. Four of the interviewees were women.

In the interviews, the participants were asked to reflect on their experience as a supervisor and examiner, both at the ANU and at any other institution, and on their own experience as a PhD student. A copy of interview schedule can be found in Appendix D. The transcripts of the interviews were analysed by a member of the research team who was not informed of the identity, and in particular the gender or discipline cluster, of each interviewee. The results of the initial analysis were presented for comment to some of the original interviewees and to other groups of academics both at the ANU and elsewhere.

Interviews with Recent Students

To complement the data obtained from the interviews with the experienced supervisors, three small groups (fourteen individuals in total) of postdoctoral fellows (recent 'successful' students) were also interviewed in depth. In addition, a repertory grid technique was used with the postdoctoral fellows in order to determine what personal constructs concerning supervision had been developed by the postdoctoral fellows' recent experiences as PhD students. The technicalities of personal construct theory are not of concern to this study. The method was used primarily to allow the postdoctoral fellows to express in their own words the characteristics which they considered to constitute 'good' and 'bad' supervision.

The Surveys of all Supervisory Staff and PhD Students

Towards the end of the study, questionnaires were distributed to all members of the ANU's academic staff who were then currently engaged in the supervision of PhD students and to all PhD students. The questionnaires were prompted by the study's preliminary findings—derived from the series of interviews with experienced supervisors and recent successful students (postdoctoral fellows) and from the longitudinal study—and by the findings of previous studies at the ANU and at other Australian and overseas universities. The questionnaires were not intended to be encyclopaedic; rather they sought to clarify issues which had been raised in the preliminary findings. Copies of the student and staff questionnaires can be found at the ends of Appendices E and F respectively.

Features of the questionnaires' approach are:

- their concentration upon three periods of the PhD: 'the first six months or so', 'the middle year or so' and 'the last six months or so'—as will be seen this approach allows marked longitudinal differences in supervisory style to become apparent;

- their recognition that students often had supervision relationships with more than one academic; and
- their recognition of the importance of the structural elements of supervision—seminars, workshops, etc.

The questionnaires were mailed in the middle of 1993 to all ANU academics who had had responsibility for supervising and/or advising at least one PhD student in 1992 and to all PhD students. The questionnaires were distributed under the auspices of the Dean of the Graduate School who provided a cover memorandum encouraging academic staff and students to participate in the survey. Respondents were assured that their responses would be treated in confidence and that data would be released only in the form of statistical summaries. A follow-up memorandum from the research team was circulated two weeks after the original questionnaires. The ANU's Postgraduate and Research Students' Association also used its newspaper to encourage students to complete the questionnaire.

Coded responses were computer analysed using the Statistical Package for the Social Sciences. Breakdowns for all questionnaire variables of the survey of PhD students were obtained by the gender, age, discipline cluster, country of origin and first language of the responding students. Breakdowns for all questionnaire variables of the survey of supervisory staff were obtained by the gender, age, discipline cluster, graduate education background and teaching and research responsibilities of the responding academics.

Of the 983 students who were enrolled for the degree of PhD in 1993, 363 returned the questionnaire, giving a response rate of 37%. Details of the demographics of the response population are contained in Appendix G. Of the 658 ANU academics who supervised and/or advised at least one PhD student in 1992, 306 returned the questionnaire, giving an overall response rate of 47%. A breakdown of the responses by area of the university, gender and age indicates that the sample is broadly representative of the ANU's population of academics. Details of the demographics of the response population are contained in Appendix H. It should be noted that the transient nature of both the academic and student populations means that both of these response rates tend to underestimate the responses to the surveys. Some academics and students would have been in the field, at conferences or on leave at the time of the questionnaires. In interpreting the results of the surveys, we cannot overlook the possibility that supervisors and students who were either satisfied or dissatisfied with the current organisation of graduate study at the ANU may have replied disproportionately. On the other hand there is no *a priori* reason to believe that either group had more reason to respond to the survey.

Outline of the Report

The report is structured in three parts and has eight appendices. Part I provides comparative and historical perspectives on PhD supervision; Part II presents an ethnography of supervisory practice based on a series of studies carried out by the authors at the Australian National University, but which because of the diverse population studied draws on experience of other institutions in Australia and overseas; and Part III draws together the findings and presents conclusions and recommendations for policy and action.

Part I consists of this introduction and Chapter 2. In the first section of Chapter 2 a brief history of the development of the PhD is presented. The second section of Chapter 2 presents an overview of the current state of PhD education throughout the world. The history and current state of PhD education are outlined in Chapter 2 in order both to illustrate the variety of alternative models of PhD education which are already available and to undermine the ever present inertial myth that, as one academic put it during an interview, 'this is how it has always been done'.

Part II seeks to reveal the variety and diversity, as well as the commonalities, of supervisory experiences and is divided into four chapters. Each chapter is based upon one, or, in the case of Chapter 3, two, of the studies carried out by the authors at the ANU. These chapters give complementary perspectives on the PhD experience drawing on experience at the ANU and other institutions. Chapter 3 presents student perspectives on 'doing' a PhD, combining case studies of actual students over time and the reflections of postdoctoral fellows who were deemed to be recent successful students. Chapter 4 draws on the responses to the survey of PhD students to establish the extent of variation in practice and the impact of the institutional and disciplinary structures at the ANU. Chapter 5 presents staff perspectives on effective supervision drawn from interviews with experienced supervisors and Chapter 6 draws on the responses to the survey of supervisory staff to establish again the extent of variation in practice and the impact of the institutional and disciplinary structures at the ANU.

Part III discusses the implications of the studies for practice and institutional support structures and provides recommendations for policy and action. The outcomes of the report provide a preliminary framework and recommendations for enhancing quality in PhD education. They provide a basis for the formulation of policy concerning procedures, student support, and professional development for staff.

Notes

¹ For the continuing high rates of dissatisfaction with supervision expressed by students see, for example, Cullen (1989). For the continuing long completion times of students see, for example, Australian Vice-Chancellors' Committee (1990).

2. HISTORICAL AND COMPARATIVE PERSPECTIVES

Graduate education has not always been with us. The term ‘Doctor’ had been used from the very beginning in some universities, Bologna for example, to denote persons qualified to teach—persons who had satisfactorily completed an apprenticeship in the guild (*universitas*) of teachers. The PhD—the notion of a researching teacher—has, however, a much shorter genealogy. It is both naive and anachronistic to assume, as does the American Council of Graduate Schools, that the degree of Doctor of Philosophy awarded today is ‘based on traditions that go back to the founding of the universities of Western Europe’ (Council of Graduate Schools, 1990a, p. 2). The current degree cannot be viewed as a simple modification of previous practice in line with new knowledge and new technology. There is, in fact, a historical discontinuity in the meaning of the term. In particular, the thesis of a connection between good research and good teaching around which the idea of the PhD currently revolves was not spelt out by the German academic Humboldt until the early nineteenth century. Before the elaboration of this thesis, university teachers were neither expected nor encouraged to engage in research (Simpson, 1983, pp. 13–7). Not only has graduate education not always been with us, the practices and structures of graduate education have not always been as they currently are. The current practices and structures—the dominant paradigms—of graduate education in Australian higher education institutions are the result of a long history of complex social, political and economic as well as educational conditions and developments in Germany, the United States of America and the United Kingdom as well as in Australia. It is beyond the scope of this study to tell that history, but some snapshots of the PhD at various times and in various countries are provided here to highlight the contingent and historical nature of the current practices and structures of graduate education in Australia.

Historical and Comparative Perspectives

The PhD in Nineteenth Century Germany

In their quest to be a researching teacher, and under the influence of the ideas of Humboldt, the student in the nineteenth century German university:

... was free to specialise in his particular field of interest, choose his courses and even move from one university to another. So long as he could prove attendance at a number of courses and satisfy examiners by producing the requisite thesis and defending it satisfactorily in the faculty, he would be awarded the degree. Unfettered by examinations, he experienced a training in research under the

supervision of university teachers who themselves were immersed in creative intellectual pursuits (Simpson, 1983, p. 14).

The apparent similarities between this picture and the usual experience of current Australian PhD students are of less interest than the differences. Note particularly, that the student's course of study contained coursework—or rather, courses of lectures on current research by current researchers—and that the student was not necessarily supervised by a particular academic or even tied to a particular institution.

The PhD in the United States of America

Following, and influenced by, the development of the PhD in Germany in the early nineteenth century, universities in the United States of America began to offer similar courses of study and in 1861 Yale awarded the first American PhD. Particularities of American culture and especially the competitive spirit of American universities and colleges led, however, to reformations and re-evaluations of the PhD.¹

The PhD degree itself, for example, soon became an almost mandatory requirement for appointment to a teaching post in an American university. In Australian parlance, the PhD had become a 'union ticket' and academia now operated, in the main, on a 'no ticket, no start' basis. Unfortunately, possession of a 'union ticket' does not necessarily guarantee possession of the requisite skills. The philosopher William James (1903) declared that the term 'Doctor' was no longer a certification of an ability to teach (at undergraduate level), as it had been in the medieval universities. It had become instead 'a sham, a bauble, a dodge, whereby to decorate the catalogues of schools and colleges' (p. 338) and as James noted further:

The same belief in decorated scholarship expresses itself in two antagonistic passions, one for multiplying as much as possible the annual output of doctors, the other for raising the standard of difficulty for passing, so that the PhD of the special institution shall carry a higher blaze of distinction than it does elsewhere (p. 333–4).

Another significant feature of graduate education in the United States of America is the existence within the USA's higher education system of separate institutions, or sub-institutions/programs, devoted to graduate education. From the beginning, with the foundation of John Hopkins University in 1876 solely for the purpose of graduate education, graduate education in the USA has tended to be organised as a separate structure or as a distinct substructure of a higher education institution. According to the American Council of Graduate Schools the roles of such graduate institutions include:

- Articulating a vision of excellence for the Graduate Community;
- Establishing a set of policies which define good practice in graduate programs, high quality in curriculum, excellence in student selection, and rigour in faculty appointments;

- Ensuring equity across all academic disciplines by minimum admission and completion requirements;
- Defining what graduate education is and what it is not. In particular, clarifying the difference between graduate and undergraduate education;
- Bringing an institution-wide perspective to all graduate endeavours and providing a cross-university perspective;
- Enhancing the intellectual community of scholars among both graduate students and faculty;
- Serving as an advocate for graduate education;
- Emphasising the institution-wide importance of training future university teachers;
- Developing ways for graduate education to contribute to and enhance undergraduate education;
- Supporting and furthering the non-academic interests of graduate students; and
- Serving as an advocate for issues and constituencies critical to the success of graduate programs (Council of Graduate Schools, 1990b).

The establishment of separate graduate institutions, within or without universities, also allows for a division of labour—a division which has been adopted in many American universities—between undergraduate and graduate education. In many American universities not all academics who teach at undergraduate level are members of the graduate faculty. That is, not all academics may or do supervise PhD students. Indeed, some Graduate Schools further stratify their faculty between those entitled to supervise PhD students and those entitled to give graduate courses or supervise masters students. At Florida State University, for example, any member of the instructional faculty of the university may be considered for membership of the graduate faculty but such membership is not automatic and is determined on the basis of the individual's qualifications. There are, moreover, three levels of graduate faculty membership: graduate faculty status, master's directive status, and doctoral directive status:

- *Graduate Faculty Status*: Members of the instructional faculty with Graduate Faculty Status are permitted to teach graduate courses. They are not permitted to serve on or chair master's or doctoral committees. The minimal qualifications for appointment to the graduate faculty are the possession of a doctorate or its equivalent and proven expertise in teaching.
- *Master's Directive Status*: In addition to teaching graduate courses, members of the graduate faculty with Master's Directive Status are permitted to serve as 'major professor' for master's degree students and to serve on supervisory committees for doctoral students (provided that the latter committees also have at least three members with Doctoral Directive Status). In order to achieve Master's Directive Status academics must have completed a doctorate or its equivalent and have proven

ability to conduct scholarly research and publish in reputable media or to perform equivalent scholarly or creative works.

- *Doctoral Directive Status*: Members of the graduate faculty with Doctoral Directive Status are permitted to perform all functions appropriate to graduate education. The minimum qualifications for appointment to Doctoral Directive Status are attainment of recognised professional stature in the discipline by virtue of substantial postdoctoral or equivalent scholarly or creative work and experience in the supervision of graduate students (Florida State University, 1991, pp. 141–4).

Florida State University also allows for supervision by non-members of the University's academic staff. Individuals who are not members of the university's academic staff can supervise masters and doctoral students if they have been awarded Co-Directive Status.

At some institutions an academic's membership of the graduate faculty is reviewed at regular intervals regardless of whether or not they have tenure as a member of the university's faculty. As a consequence, participation in graduate education and, in particular, the right to supervise PhD students is used and seen as a reward conferred upon faculty members. It is also sometimes seen as a task requiring special skills and experience which are not necessarily possessed by all academics. The American Council of Graduate Schools (1990b) argues that:

The advantage of identifying a separate graduate faculty is that it provides a specific review process aimed at ensuring that only well-qualified, active faculty members are involved in graduate programs. This is particularly important in institutions where some faculty ... may not be trained for involvement in graduate programs. ... Many institutions utilise a periodic review or reapplication process to provide an incentive for faculty to remain current in their fields and active in research, and to assure graduate students that the faculty have been judged by peers to be productive scholars capable of involvement in graduate programs (p. 21).

Another significant feature of the American PhD is the degree of preparatory coursework taken as part of the PhD. Students and academics at Australian universities frequently scoff at the idea of the introduction of coursework into the PhD but this reaction is often the result of a misapprehension, based on a lack of experience, of the nature of graduate coursework. A distinction needs to be drawn between coursework which is essentially undergraduate—lecture based and concerned with the reproduction of knowledge—and genuinely graduate coursework which may be seminar based and which is concerned to facilitate the socialisation of students into their disciplines and to assist students to make the move from reproduction and analysis to speculation which is central to the idea of research. At the very least, graduate coursework allows students to meet and observe potential supervisors and to develop research proposals systematically and with proper oversight before committing themselves to the research proper.

Two other related features of the American PhD system are the increased use by that system of panels of supervisors and thesis advisers and the comparatively larger sizes of their graduate programs. It may not be accidental that the American system uses the term ‘adviser’ to refer to academics involved in graduate education. The different relationship between academic and student suggested by this term—as opposed to that suggested by the term ‘supervisor’—may well obtain. Certainly, the comparatively larger sizes of American graduate programs must help in the development of collegiality between students and this, together with the existence of panels, may help to lessen the student’s dependence upon a one-to-one relationship between themselves and a particular academic.

The PhD in the United Kingdom

The move towards ‘researching teachers’ was much slower in the United Kingdom than in the United States of America, principally because the tutorial system focused the attention and time of university teachers on undergraduate education and because the college system meant that few institutions could raise the funds necessary to set up research laboratories. In the end the PhD was introduced more as a political expediency—the Foreign Office was concerned with the trend of American and colonial students to move to Germany for their graduate training—rather than out of any deep pedagogic commitment (Simpson, 1983, pp. 117–21).

Nevertheless, once introduced, the PhD was enthusiastically taken up by several distinguished British academics including Ernest Rutherford who opined that the introduction of the PhD into the United Kingdom in 1917 was ‘a real and very great departure in English education—the greatest revolution ... of modern times’ (quoted in Simpson, 1983, p. 155).

That the PhD system was grafted, reluctantly if not unwillingly, onto already existing universities had its effects, however. In particular, the position of British PhD students appears to have been less fluid than that of their German counterparts. Students were tightly connected to particular institutions and within those institutions to particular individuals—this may in part have been a consequence of the individual tutorial arrangements which already existed at undergraduate level in some British universities.

The PhD in Australia

The first PhDs were awarded in Australia by the University of Melbourne in 1949. The system of PhD education introduced into Australia was, not surprisingly, based heavily on the British system. In particular, students were tied tightly to their institutions and to particular individuals within those institutions.¹

In recent years the number of Australian PhDs has grown rapidly. In 1950, eleven Australian PhDs were conferred. By 1960, when all the then existing Australian universities

had begun to offer the PhD, this number had grown to 137. By contrast, in 1987, 974 PhDs were conferred by, and 8,563 PhD students were enrolled in, universities throughout Australia.

One issue which concerned the pioneers of PhD education in Australia was the question of attendance. At the Australian National University the initial rules governing PhD education required students to 'keep grounds'—to reside within a short distance of the university—for eleven months of every year. Staff of bodies such as the CSIRO were allowed to enrol, however, often under a fiction that they were not external to the university. Debate is currently occurring within the university as to a relaxation of this rule and in particular one Graduate Program has proposed locating some of its students at an industrial research site in Melbourne arguing that students at such a site would be better socialised to the needs of their eventual employers.

A related question is whether students can or should be supervised by persons who are not members of the university at which the student is enrolled. External supervision arrangements—with one or more of the student's supervisors not being a member of the university—are now common in some Australian universities.

Issues of current central concern to the Australian graduate education system are the quality, scope and purpose of PhD education. The general concern of all Australian universities with graduate education was expressed in the report of the Australian Vice-Chancellors' Committee Sub-Committee on Academic Standards (1987). *Inter alia*, the report states that:

The maintenance of standards in postgraduate education is crucial to the principal function of the universities—the preservation and transmission of knowledge by teaching, and its extension by research. ... The postgraduate programs of universities are the means for transmitting the most recent advances in knowledge, and for training new generations of scientists and scholars in the methods and techniques of research (p. 36).

Like all aspects of current higher education in Australia, this statement must be seen and interpreted in light of the 1988 Federal Government Policy Statement on Higher Education (the *White Paper*) which set out the Government's 'strategy for the long-term development of Australia's higher education system' (Dawkins, 1988, p. 3). With regard to graduate education the *White Paper* noted that: 'Postgraduate education is central to the research undertaken in universities and to the supply of high-level graduates to undertake research in industry, the CSIRO and defence research industries' (p. 95).

The clear suggestion of the *White Paper* is that the role of graduate training is no longer confined to the reproduction by universities of their own skilled labour force. The *White Paper* recognises that students now undertake PhDs for a variety of reasons and with a

variety of expectations regarding future employment. It also recognises that there are now a number of consumers, other than students, each seeking to be served by the PhD productive process. Of course, the interaction between business and industry and universities is not new. Ever since the latter's establishment, educators and external employers have engaged in debate about the purpose and content of higher education. Jones (1986), for example, has argued that universities have always served to provide the professionals required by big business and government. There are, however, now a number of important differences. The debate has extended to include PhD education for the first time—note the introduction of government doctoral scholarships linked to industry involvement. The voices of business and industry in this debate have also, through government rhetoric and policy, been given more authority (Baldwin, 1991, p. 8).

Political, Economic and Educational Perspectives

The history of the introduction of the PhD into Australia outlined above serves to highlight some of the central issues currently facing PhD education:

- the relation between teaching and research—in particular, the question of whether the PhD is a good preparation for a university teacher and the question of whether the research training obtained during the PhD prepares students for work outside universities;
- the proper arrangement of supervision within an institution—in particular, the question of whether students should be supervised by a single supervisor and to what extent such a supervisor should have sole responsibility for the oversight of the progress and broader academic development of the student; and
- the role of coursework in the PhD—in particular, the question of whether the PhD process can be made more efficient by the introduction of structured coursework at the beginning of the PhD.

These issues are not only of historical interest. Indeed, if the introduction of the PhD into the United Kingdom in 1917 was the greatest revolution of modern times, then the 1990s must be seen as graduate education's period of openness and restructuring. Throughout the western world, both the scope and purpose of PhD education are being questioned and the efficiency and effectiveness of the education itself is being subjected to close scrutiny. One consequence is that changes in course design and length are either being considered or have already been implemented.

Current Problems

A recent examination by Holdaway, Deblois and Winchester (1993) of the current international academic and governmental literature in graduate education indicates that discussion in the literature presently centres around two specific problem areas:

- ‘completion times and completion percentages [rates]’; and
- ‘the quality of graduate students and their programs’ (p. 5).

Educational authorities in Denmark, Finland, Norway and Sweden, for example, have as objectives for graduate training in the 1990s increasing the quality of training and decreasing the time required (Kyvick, 1991).

In Australia, concern has also been expressed both about completion times and completion rates and about the quality of graduate students and their programs. A comprehensive study by the Commonwealth Department of Employment, Education and Training (1988) of the completion rates and average completion times of the 1979 cohort of Postgraduate Research Award holders found that the average time to submit for PhD students holding a Commonwealth award ranged from 52.6 months for science students to 56.8 months for arts, humanities and social sciences students. The study also found that the completion rates for science and engineering students holding either a Commonwealth or a University award were considerably higher than those for students from the arts, humanities and social sciences—an average of 77 per cent of male students and 60 per cent of female students compared to an average of 48 per cent of male students and 41 per cent of female students (pp. 17-9).

With respect to the quality of PhD students and their programs the *White Paper* noted that:

... there is a view in the academic and employer communities that the current research-based postgraduate programs no longer provide adequate training even for a research-based career. There is a demand for postgraduates with multi-disciplinary training, who are capable of the broad analysis needed in rapidly changing social, technological and economic circumstances (Dawkins, 1988, p. 95).

Current Solutions

Together with the international consensus which obtains concerning the current problems facing PhD education there is a consensus concerning the solutions to these problems.

These solutions centre around:

- improving supervision; and
- introducing coursework and graduate schools.

In the United Kingdom, for example, modifications to the form which graduate training in the humanities takes have been proposed by the British Academy. The proposed modifications include the requirement that students undergo one or two years of graduate preliminary training in order to be eligible to apply for a three year PhD scholarship

(Griffiths and Richards, 1992). The British Economic and Social Research Council has already issued guidelines on graduate research education which set out the sort of training the Council believes to be required by PhD students. This training could consume up to 60 per cent of the time of a first-year student and up to 10 per cent of a student's time in the remaining two years (Utley, 1991).

In Germany, France and the Netherlands, graduate schools are being established. Each of these schools concentrates upon a particular theme and provides both research supervision and taught courses (Aldhous, 1991).

In Canada, the Royal Society of Canada (1991) has recently recommended that:

The Canadian Association of Graduate Schools should propose guidelines to encourage high standards of supervision and speedier completion of programs of graduate study, particularly those leading to doctoral studies (p. 24).

In Australia, the Australian Research Council (1989) has recommended that:

... firm steps, including the establishment of a code of supervisory duties, be undertaken by institutions to improve supervision of research students and the monitoring of supervision and student progress (Recommendation 14, p. 59).

and, as a result, changes were made in the Commonwealth Postgraduate Research Award Scheme including a government requirement that each university have a code of supervisory conduct and an internal appeals mechanism through which students could challenge adverse decisions. The Higher Education Council (1990) has also recommended that:

... institutions continue to develop action plans to review their higher degree studies programs and particularly to monitor the progress of academic organisational units (faculties, departments etc) with respect to:

- improving supervision and supervisory arrangements, including the publication of institutional policies and examples of good practice;
- examining student research proposals before they begin their programs of study or, where this provision is inappropriate, to have a provisional enrolment period until the research proposal is examined;
- initiatives to increase numbers of higher degree graduates in national priority areas; and
- co-operative initiatives with other institutions, industry and commerce/government/professional or community associations for mutual benefit through formal and informal links (Recommendation PG12, pp. 74–5).

Sekhon has argued that the 'attitudinal deficiencies' of PhD students with respect to industrial culture can best be overcome by adopting an alternative model of doctorate education with substantial taught components and less emphasis on original enquiry and

through the joint determination by academic and industrial interests of research topics; the institution of panels of two or three supervisors, with the supervisors drawn from both academia and industry; the recognition of work performed in industrial laboratories; and through allowing students to submit, as an alternative to a traditional thesis, a series of papers describing solutions to problems of industry (Sekhon, 1986; 1989)

These world wide trends again serve to highlight some of the central issues facing PhD education at the present time. In particular:

- the need for many PhD students to undergo periods of research training prior to the commencement of their PhDs;
- the scope, purpose and usefulness of the introduction of coursework into PhDs;
- the scope, purpose and usefulness of graduate schools in enhancing the research experiences of PhD students and increasing the critical mass of students working in particular academic areas;
- the design of effective and appropriate supervisory arrangements to facilitate the efficient and effective production of quality PhDs; and
- the need to design PhD education so as to be able to meet the differing needs of both the universities and industry.

Improving Practice

The task of improving graduate education is not, of course, an easy one. As de Wied (1991) has argued with regard to Belgium, France, Germany and the Netherlands:

... the attempt is being made to adapt deeply rooted attitudes and expectations, long established organisational forms and traditions, to what now seem to be the exigencies of efficiency and international competitiveness (p. 12).

It is therefore useful to recognise that the issues of current concern to PhD education are not, as is sometimes thought, new issues. The historical consciousness that PhD education has adapted itself to similar challenges in the past may help to overcome the inertia inherent in the view that PhD education is, and has always been, both *sui generis* and the same. The current organisational forms and traditions of Australian graduate education are not long established, although the attitudes and expectations of both academics and students may be deeply rooted.

The second objection listed by de Wied, the concern that pedagogic practice is being sacrificed on the altar of economic rationalism, is equally chimerical. As Cullen and Allen (1993) have argued:

... the principal cause of the apparent conflict between the maintenance of the quality of higher education and the need to improve its efficiency and effectiveness lies in the fact that higher education, and in particular PhD education, serves a number of consumers each of whom has their own needs and hence their own conception of quality (p. 107).

The question of the relation of the concern for efficiency and effectiveness to the concern for quality in graduate education is, unfortunately, beyond the scope of the current report. Suffice it to say that while all the proposals and changes considered above indicate the concern of funding agencies and university administrators with the efficiency and effectiveness of PhD education, particularly with regard to students on scholarship, this concern is not only over long completion times and low completion rates. For example the introduction of coursework into higher degrees is not purely motivated by efficiency, directed towards the goals of shortening mean completion times and improving completion rates and thus lowering costs. Such proposals are also concerned with the effectiveness of the education and when related to the knowledge and skills of the graduate—the finished ‘product’ of doctoral study—the proposals are also concerned with the quality of higher degrees. The suggestion of Stranks (1984) that PhD courses include some modules of business management coursework, for example, is made precisely to ‘enhance the effectiveness of PhD graduates in commerce and industry’ both of whom, together with universities themselves, are now significant consumers of PhDs (p. 175).

Other proposals for change in graduate education—including the appointment of supervisors from industry, the recognition of work performed in industrial laboratories and the joint determination of research topics by academic and industrial interests—are directed, as we have said, towards improving the effectiveness of PhD education by overcoming what are perceived to be attitudinal deficiencies in individual graduates with regard to the differing emphases placed on research and development by industrial and academic cultures. In this regard, Stranks (1984) suggests that coursework can emphasise ‘the need in our future PhD graduates to achieve high international standards in personal research accomplishment yet provide a broader background of intellectual understanding and the encouragement of wider social attitudes’ (p. 175).

There is a sense, however, in which the exigencies of efficiency do unnecessarily impinge upon the practices, and upon the development, of academics. The recommendations of the Australian Research Council and the Higher Education Council which we discussed earlier are framed in terms of a concern with efficiency and effectiveness rather than in terms of a concern for quality. Although quality and efficiency and effectiveness are interconnected, the emphasis in the recommendations is on codifying, regulating and assuring the efficiency and effectiveness of current practice, rather than on enhancing and enabling the development of new higher quality practices.

An approach to quality assurance through consideration of efficiency and effectiveness is necessarily limited in that while it seeks to improve current practice it is not capable of developing new and different strategies. Within the discourse of efficiency and effectiveness, concentration is upon means rather than ends. As such, the range of alternatives—others—to a given practice which can be perceived and suggested by the discourse is limited. An approach which concentrates upon the quality of the output has more freedom in the selection of alternative means.

This report is not concerned with regulating and assuring the efficiency and effectiveness of current practice; rather it seeks to explore practices and structures for enhancing quality in graduate education. In this chapter we have sought to outline both the historical development and the current state of graduate education throughout the world, both to illustrate the variety of alternative models which are already available and to undermine the ever present inertial myth that this is how it has always been done.

Notes

¹ Details of the American graduate education system are taken from Berelson (1960) and Bowen and Rudenstine (1992) and from the first-hand experiences of that system of several of the authors.

¹ For an overview of the history of the introduction of the PhD into Australia, see Australian Vice-Chancellors' Committee (1990).

PART II

THE PHD EXPERIENCE

Neither the population of PhD students nor the population of supervisory academics is homogenous. In particular the unspoken myth of the single (once usually male) student entering the PhD directly following the completion of their undergraduate education and supervised by a single (often still male) experienced academic located in their department is now far from upheld in reality. The actors and their stories can and do vary markedly.

As we have already seen, the student population is itself extremely diverse. Of the 772 PhD students at the ANU in 1992, 279 students (36 per cent) were female, 89 students (12 per cent) were part-time and 302 students (39 per cent) were from overseas. Of the higher degree students (no separate statistics are kept for PhD students) enrolled at the ANU in 1992, 36 per cent were over the age of 35. A student admitted to a PhD course also encounters a variety of different supervisory arrangements. Not only can their supervisor's age, gender, educational background and experience in supervision vary, but also the number of other students the supervisor is currently supervising. Students may also find themselves supervised by non-academics and in this case may find themselves located in laboratories or offices removed from the university. An analysis of the information contained in the databases of the ANU's Graduate Students Section reveals, for example, that of the 977 individuals who either supervised or advised at least one student at the ANU in 1992, 658 (67 per cent) are known to have been members of the university's academic staff while 24 per cent are known not to have been members of the university's academic staff (9 per cent had no location specified in the University's data base).

Of the supervisors/advisers who were not members of the University's academic staff, 19 (2 per cent of the total) were located overseas, 73 (7.5 per cent of the total) were located

interstate (mostly at other universities) and 141 (14.5 per cent) were located at other institutions within the Australian Capital Territory. Within the ACT supervision was provided by 8 academics at the University of Canberra (a former College of Advanced Education) and by 16 academics at the Australian Defence Forces Academy (a College of the University of New South Wales). Supervision was also provided by members of the Bureau of Mineral Resources (10 individuals) and the CSIRO's Divisions of Plant Industry, Entomology, Water Resources, Forestry, Information Technology and Wildlife and Ecology (29, 23, 8, 4, 4 and 3 individuals respectively).

An estimate of the demographics of the supervisors/advisers who were members of the ANU's academic staff can be obtained from the population of potential (eligible) supervisors—the population of potential supervisors is obtained by excluding tutors and postdoctoral fellows from the academic population of the ANU. Of the ANU's population of potential supervisors:

- 25 per cent were appointed at above senior lecturer level, 42 per cent were appointed at senior lecturer level and 33 per cent were appointed at lecturer level;
- 18 per cent were female (24 per cent at lecturer level, 12 per cent at senior lecturer level and 6 per cent at higher levels); and
- 48 per cent of staff obtained their highest education qualification (in general a PhD or equivalent) overseas and 57 per cent of staff had had some higher educational experience overseas. Approximately 30 per cent of ANU academics obtained their PhD at the ANU itself, 22 per cent obtained their PhD at some other Australian higher education institution, 25 per cent obtained their PhD at a higher education institution in the United Kingdom, 16 per cent obtained their PhD at a higher education institution in North America and 8 per cent obtained their PhD from other overseas higher education institutions.

On average each individual (considering both the internal and the external supervisors and advisers) supervised 1.3 students and advised a further 1.2 students. Those members of the ANU's academic staff who supervised or advised at least one student, supervised on average 1.6 students and advised a further 1.3 students (significantly more than for external supervisors/advisers). Within the ANU, 66 per cent of eligible academics supervised or advised one or more students, 32 per cent had four or more students assigned to them. Differences across the five discipline clusters are not readily apparent. However, academics in the Hard/Pure discipline cluster tend to be assigned a significantly higher number of advisees (1.7). With respect to the total number of students assigned to each academic, the averages for academics in the Hard/Pure discipline cluster (3.4) and the Hard/Applied discipline cluster (2.6) differ significantly.

In the next four chapters we describe the commonalities and the extent and type of variation in supervisory practice which students and staff can encounter given the above demographic variations in the student and supervisor populations, together with the variety of supervisory arrangements possible.

3. STUDENT PERSPECTIVES

Perspectives Over Time

In the initial stage of the project we asked volunteer students to keep a diary of workload and activities and to complete a weekly questionnaire about their activities and progress (Appendix C). Although this part of the study proved difficult to carry out, what was achieved was eight slices or vignettes of stages in students' progress towards a PhD. These vignettes give descriptions of student progress which do not focus on discrete or pre-identified 'problems', but on what students were doing and how they saw it at the time the events took place. It was from these data and discussions with the students by one of the authors that we identified some of the elements of the supervisory process which were explored further in other aspects of the study.

Four men and four women took part in the longitudinal study. With respect to the stage of the PhD at which the students were when the study commenced:

- four were beginning: one from the Hard/Applied discipline cluster, one from the Hard/Pure discipline cluster, one from the Transitional discipline cluster and one from the Soft/Pure discipline cluster;
- three were completing: one from the Transitional discipline cluster, one from the Soft/Pure discipline cluster and one from the Hard/Pure discipline cluster; and
- one was midway in their candidature: from the Soft/Applied discipline cluster.

Workload

The range of hours recorded on the weekly pro-forma was from zero to 80 per week. The average weekly hours varied from 22 to 50. Arranged by discipline cluster the individual averages were:

- Hard/Pure discipline cluster - 50 hours per week, 35 hours per week;
- Hard/Applied discipline cluster - 26 hours per week;
- Transitional discipline cluster - 37 hours per week, 37 hours per week;
- Soft/Applied discipline cluster - 39 hours per week; and
- Soft/Pure discipline cluster - 22 hours per week, 34 hours per week.

The weeks where no work was recorded were mostly holidays and connected with Christmas, but one student worked right through the Christmas period. These holiday weeks serve as a reminder that PhD students have the normal human need for rest and recreation. Not surprisingly one student came back from leave, reviewed the work situation, was able to clarify directions and proceed onwards with enthusiasm. The 80 hour week (and no Christmas break) was clocked by a student who was moving with speed towards the end of the PhD with a solid and accumulating workload in the laboratory achieving the results which, the student noted, 'just should have been last year'.

In comparing diaries and the weekly pro-formas, there appears to be a tendency to under-report hours, and to exclude activity which was not directly connected to the research task. Such activity included going to a graduation and working on an honours paper for publication, working on an application for a postdoctoral fellowship and a query about whether conference going should be counted as 'work' for the PhD.

Progress

What were the students doing? The diaries document a mixture of activities, not all directly related to their PhD: setting up experiments, reading, photocopying, analysing results, learning new techniques, buying or arranging the purchase of equipment, encountering new ideas, writing papers, attending conferences, attending discussion groups and seminars, talking to other students and visitors, meeting with supervisors, getting sick, working part-time, dealing with family crises, applying for jobs or for funds for part of the research, applying for scholarship extensions, aerobics, going to the bar, going on holiday and exalting over good results of an experiment. Much of what is recorded is repetitious, described in varying ways such as:

[This week] nothing in particular [happened] except a stalemate in writing.

Just kept going.

No special difficulties [this week,] other than the tedium of filtering out repetitions from multiple sources.

As you can see a real thriller of a week. Still getting through it all.

Significant events and difficulties recorded included getting results, discussions with supervisors or other academics, bad weeks where nothing went right, financial matters and scholarships, technical and equipment arrangements, job prospects, conferences and visitors, family concerns and sickness.

Some students appeared to experience more extreme fluctuations in mood than others. High points were good results—'I got another nice clean result'—or getting a document in time

to use it near the end of writing the thesis. Low points were when the results were contrary to expectations, finances were difficult, an article was rejected (just as the student was facing up to the challenge of writing the thesis), or there was worry about scholarship extensions. What emerged too were instances of the intermingling of personal and study concerns. A good example was that of a student for whom a car break down with attendant need for money for repairs was potentially damaging by limiting the possibility of fieldwork. Another was where a married student with parenting responsibilities got more work done in the week the student's child was away on holiday.

The students, like beginning junior members of staff, were affected by contingencies over which they had limited control—for example, the availability of technical staff assistance, the placement of roommates in shared offices. It was here that students looked to supervisors to assist in dealing with other staff and the University administration.

Supervisory Assistance

The students were asked to indicate their view of their progress, their feelings about this and the degree of help they received from their supervisor. Although their views of their progress fluctuated, all were making some progress most of the time. Feelings were not always positively correlated with progress, however. Sometimes students felt they were making progress and were worried and sometimes they were unconcerned about a lack of progress. In one case what had seemed a major matter for a student—the extension of a scholarship—was mentioned some weeks after the matter was settled in the student's favour as of minor note.

The students' records of supervisor assistance bore little direct relation to the fluctuations. Only three of the eight noted instances of none or not enough help from their supervisors in the weekly pro-forma over a total of 117 recorded weeks. For two this was only once in a nine and 16 week segment respectively. Another student who kept a diary for 33 weeks reported 5 instances of lack of supervisory assistance, but noted nothing else in the diary to indicate major difficulties with this.

It is clear from studying the detail that different students had varying interpretations of what is encompassed by the term supervision, just as they had for workload. One student, for example indicated on the weekly pro-forma that they had had all the help they needed from their supervisor, but in reference to significant events gave the detail of problems with the their stipend and claimed that there was 'little or no support' from the supervisor. Another student who was very concerned with their progress visited the Counselling Centre without apparently implicating the supervisor in the matter. In these cases there appears to be a demarcation being made between personal and work concerns. This distinction was not made by any of the students in recording 'significant events with regard to completing your PhD' on the same weekly pro-forma.

In the 117 recorded weeks, 18 and 16 references were made to supervisors (and advisers) in relation to significant events and difficulties respectively. In the diaries all students saw their supervisor at some time but only two students indicated regular meetings (one from the Hard/Applied discipline cluster and one from the Transitional discipline cluster located in an industrial laboratory). This is not to suggest that supervisors were not important. Rather they appear more as resources and guides to be accessed as needed, for example one student in the middle of their PhD commented that they had:

Talked to one of my PhD advisers for the first time and discussed what we could do for each other.

Supervisors were also appreciated when their presence helped—as in the examples of a supervisor setting arrangements up for a student. In one instance a student who was losing direction said some ‘supervisory interference could be useful’. Supervisors were also called on for help with funding for analyses, conferences and equipment.

In one case a student was funded from outside the university, and supervised by a panel of external and University staff. This appeared to work well. One of the reasons was clearly to do with both the student’s initiative (as in the quote above about meeting the adviser) and that of the student’s supervisor:

My supervisor sat down with all the people working in my area (including me) and we planned out our research for the next year.

seven weeks later: *Attended two major supervisor/adviser meetings at which we planned out my PhD and other people’s complementary research.*

There were glimpses too of a more fluid relationship with supervisory panels. Students made reference to different supervisors and in two cases experienced a change-over of supervisors as staff moved on. A sense of distance comes from a comment like this:

One of my supervisors is obviously upset with me—but I can’t understand why since I’ve hardly seen him in recent weeks.

The complex and dynamic nature of individual supervisory relationships is given in the story of one student (from the Transitional discipline cluster and finishing) who reported:

Finally managed to get some clean-cut results that answered some (but not all) questions I have wanted answered for the last twelve months.

Discussed future directions of research with supervisor. I haven’t yet decided which avenue to take after I get my current line of research tied up. My supervisor says that this needs to be my decision. This is the first stage in my research where it hadn’t

been fairly obvious what to do next and so it is a challenge to decide which questions I should try.

three weeks on: Major difficulties were trying to decide which experiments to do next since I can't do all the ones I want to do.

the next week: My supervisor is unwilling to help me decide which avenues (out of the many that keep appearing) would be the most useful to pursue. He says that it is essential that I learn how to do this myself. I basically agree, but find it difficult because it is not quite clear how much is 'enough'.

after three weeks holiday: Significant review of previous work: put in perspective against other work in the area; made decision about which are the most essential questions to answer so that I can finish and start writing.

some weeks follow of hard work, good results, lack of time, getting sick and complaint of: 'usual lack of moral support from supervisor.

Other Sources of Assistance

Students were asked to indicate on the weekly pro-forma which of a number of specified persons, other than supervisors, they had sought assistance from each week. Given the varying stages of the students' candidature simple aggregation is limited but is used here as an indication of the range of assistance sought. The rank order raw frequencies were:

Table 3.1: Frequency of Use of Other Sources of Assistance

Source of Assistance	Frequency Reported
Another academic	33
Another student	25
Thesis adviser	10
Computer adviser	10
Statistician	8
Other technical	8
Other	2

All eight students sought assistance from another academic, six from their thesis adviser and five from another student.

Some of this assistance was sought at clearly marked phases of the PhD study as one would expect. For some, many extra persons were involved in one week as the research

demanded. For example one student was very reliant on technical assistance at the beginning of her research; another used computing and statistical assistance as the results came in and required analysis.

Interaction with other academics was clearly very important for a number of reasons. In one instance the academic mentioned job prospects—a welcome boost to confidence; in another instance another academic in a neighbouring department gave access to equipment for a particular process in the research; in others the students gained new ideas to illuminate research directions. It was evident that conferences and seminars played a similar role as described by one student and echoed by others:

Conference was good for stimulating ideas/models which I can test in my research.

Technical assistance was important for students in equipment-based areas and they were more likely to work with and depend on the help of technical assistants. However many were also acquiring such help from other students and in one case the student was teaching a postdoctoral fellow a technique.

Finally, two stories of students who are respectively beginning and finishing give further evidence of variety and complexity.

Patrick

Patrick is in his early thirties and is married with one child. After studying and working in another state for a number of years Patrick applied for and received a scholarship to a humanities department at the ANU. As part of his application Patrick had outlined the project which he intended to undertake—the application of a new theoretical viewpoint developed in a humanities discipline to an existing problem in a social science. Patrick assumed when his application was accepted that this constituted acceptance of his research project and was surprised to find upon his arrival that the humanities department in which he was located had no expertise either with the new theoretical viewpoint he wished to apply or with the social science problem to which he wanted to apply this viewpoint. From their point of view the department had considered Patrick's proposal only as a preliminary suggestion and as evidence that he was capable of designing a research proposal. They argued that the current research interests of members of the department were well known and that Patrick had been sent a copy of these research interests at the time of his application.

Rather than change projects Patrick changed departments. He found a social science department which had expertise in the problem with which he was concerned although no expertise in the theoretical viewpoint which he wished to apply. Fortunately the department was hosting a conference at the time that Patrick joined it and at that conference Patrick met a number of overseas academics who were familiar with the theoretical viewpoint which he

wished to adopt. One of these academics agreed to become a part of Patrick's supervisory panel. Since then Patrick has been nominally supervised by an ANU academic but has received most of his supervision via electronic mail.

Technology has worked well in this regard and Patrick has received constant and almost immediate supervision via electronic mail. Difficulties have occurred however in that the members of the Department in which Patrick is located made strong suggestions at the time of his midterm review that his thesis would require a number of additional chapters. Patrick believed that these chapters were not necessary given the theoretical approach which he was taking. This difference was complex and not just a matter of the department's academics not understanding Patrick's theoretical approach. The academics were in fact in academic dispute with the validity of Patrick's theoretical approach.

Patrick also felt that he faced problems in the appointment of examiners because the examiners which the department was in the habit of approaching would not appreciate or agree with the theoretical approach which he was taking. Aside from this continuing problem, Patrick faced a number of other interesting dilemmas as his project progressed. The following extracts from his diary reveal the two edged nature of most student experience:

Although interrupting the flow of writing, attendance at the [X] conference provided some technical information and contact with some other academics and policy makers who were helpful with clarifying a technical issue.

This week was divided between preparing a coda for the chapter that I had considered complete and preparing a brief set of notes for a seminar/panel discussion.

The main problem is that the world is changing too fast—my thesis may well be out of date by Christmas.

Despite these problems Patrick completed on time and was awarded his PhD.

Mary

Mary is a New Zealand student in her twenties. After completing her undergraduate studies in New Zealand she came to Australia to work with the academic who is now her principal supervisor. Mary's project involves frequent fieldwork excursions to remote outback Australia and was established before she began her PhD in that the data collecting equipment had been set up in the previous season. Mary had considerable input however into deciding what analyses would be performed upon the raw materials.

Mary spends approximately two to three weeks each two months in the field collecting samples. At this time she is accompanied by one of the department's technicians and occasionally by her supervisor. Whilst at the ANU her time is divided between weekly seminars, organising her field work excursions, gathering equipment and analysing the materials collected during previous field trips.

In attempting to carry out these analyses Mary learnt about the practicalities of research work as the following diary entries reveal:

Absent members of technical staff meant I was unable to do the analyses I wanted to start this week.

Laboratory analysis organised to be carried out this week had to be put off because the person in charge of the instruments required was too busy doing other work. Despite prior arrangements being made. This annoyed me a great deal. I discussed this with my supervisor and he says he will say something to the person involved once that person has finished all the pressing work (which incidentally was for my supervisor).

Once again—uncooperation from technical staff regarding analyses. I was even prevented from continuing the [X] because a vital piece of equipment was borrowed. However, a breakthrough has occurred. The [technician] has finally come to terms with the fact that my PhD project is the [X] project!! So therefore I'm taking over the analyses etc.

[Analysis] of samples was again prevented due to the loss of a piece of equipment (this time my fault) that has to be replaced through the university ordering system, so God knows when that will be.

Perspectives of Recent Students on Reflection

A series of group interviews was held with postdoctoral fellows (PDFs) to explore the perspective of recent and 'experienced' students on individual supervisory interactions. Their appointment as postdoctoral fellows at the Australian National University was taken as an indication of their success as well as experience as PhD students.

Fourteen PDFs were interviewed in three groups over a two month period. Of the fourteen, half were men and half women. Three had studied in the USA and Europe. More than half did not study for their PhD at the ANU. They came from four of the five discipline clusters (the Hard/Pure, Hard/Applied, Transitional and Soft/Applied discipline clusters).

Personal Constructs of Supervision

Using a computer-based repertory grid program designed by one of the authors, the PDFs were invited at the beginning of each of the three sessions to concentrate upon six supervisors: the supervisor that they would like to be, the supervisor who had been their principal supervisor during their PhD, two other supervisors whom they considered to be bad or worse than average and two other supervisors whom they considered to be good or better than average. The PDFs were asked to consider triplets of these supervisors—for example the two bad/worse and one of the good/better supervisors—and to identify features which, in the minds of the PDF, distinguished these three—a feature which two of the supervisors shared and which the third did not.¹ The aim of this introductory exercise was to put the PDFs in touch with their own recent personal experience, as the ground from which the discussion might proceed, and to elicit their perspective in their own language. By eliciting their perceptions of a number of known and observed supervisors and their own expectations, it was possible for them to give a judgement of the effectiveness of their own supervisor as defined by criteria developed by themselves. However the data which follow are analysed for what it tells us about aspects of the PDFs' perspectives, and the complexity of interactions, not to derive any prescriptive generalisations.

Indicators of supervisory effectiveness

The PDFs gave a range of constructs. Items correlating at the 0.6 level or more with perceived effectiveness related to:

- supervisory style,
- supervisor competence with respect to the student project,
- personal characteristics and attitudes of the supervisors; and
- the academic and intellectual standing of the supervisor.

Supervisory style

Eleven PDFs, men and women from all four disciplinary clusters studied, gave items relating to supervisory style. For three PDFs (one each from the Hard/Pure, Hard/Applied and Transitional discipline clusters) the level of direction was a factor in effectiveness. They gave items such as 'Highly directive' and 'regular meetings'. Related were a set of items about availability 'making time for students' (three PDFs from the Transitional discipline cluster) and interest and commitment to the student and their project (one PDF from the Hard/Pure and two from the Transitional discipline clusters). Communications style was raised also by four PDFs (one from the Hard/Pure, one from the Hard/Applied and two from the Transitional discipline clusters) with items such as 'explanatory when confused (not sort it out yourself)'. A gloss on direction was given by an item 'the correct level of direction' (a PDF from the Transitional discipline cluster). This was elaborated by the same PDF in another item as 'allow student to develop original ideas (doesn't direct too

closely)’. Another three PDFs (one from the Hard/Applied and two from the Transitional discipline clusters) gave as items ‘encourage individuality’, ‘encouraging of ideas’ and ‘flexible about project choice’.

Other items referred to assistance with thesis writing (two PDFs from the Soft/Applied and one from the Hard/Applied discipline clusters) and attention to other aspects of the student's life: ‘believes that students need free time’ (one PDF from the Transitional discipline cluster) and assistance in attending conferences (one PDF from the Hard/Applied discipline cluster), publishing before finishing the thesis (one PDF from the Hard/Pure discipline cluster) and ‘promotes close interaction with other academics’ (one PDF from the Transitional discipline cluster).

Supervisor competence with respect to the student project

Five PDFs (one from the Hard/Pure, one from the Hard/Applied and three from the Transitional discipline clusters) made reference to the competence of the supervisor in respect of the project. Items included ‘scientifically competent’, ‘familiar with relevant academic literature’, ‘real expertise in area of the project’ and ‘more aware of science overseas’.

Personal characteristics and attitudes of the supervisors

Thirteen PDFs from the four disciplinary clusters gave 36 items which focussed on the personal characteristics, attitudes and behaviours of supervisors. These items could be seen as descriptors of a ‘good’ supervisor who might be:

- approachable and friendly (six PDFs in total—one from the Hard/Pure, one from the Hard/Applied, two from the Transitional and two from the Soft/Applied discipline clusters);
- supportive, positive attitude (four PDFs in total—one from the Hard/Pure, one from the Transitional and two from the Soft/Applied discipline clusters);
- open minded, prepared to acknowledge error (four PDFs in total—one from the Hard/Applied, one from the Transitional and two from the Soft/Applied discipline clusters);
- organised and thorough (four PDFs in total—one from the Hard/Pure, one from the Hard/Applied and two from the Transitional discipline clusters); and
- stimulating and conveys enthusiasm for research (three PDFs in total—one from the Hard/Pure, one from the Hard/Applied and one from the Soft/Applied discipline clusters).

Other items were idiosyncratic such as ‘not obsessed by recognition and wealth’ (a PDF from the Hard/Applied discipline cluster) and ‘compatible political perspective’ (a PDF from the Soft/Applied discipline cluster).

Three constructs referring to gender were given by women PDFs: 'female' (a PDF from the Soft/Applied discipline cluster), 'interest in gender issues' (another PDF from the Soft/Applied discipline cluster) and 'women' (a PDF from the Transitional discipline cluster).

Academic and intellectual standing

Nine PDFs in all of the four disciplinary clusters studied gave items relating to the academic and intellectual standing of supervisors. Four PDFs (two from the Hard/Pure, one from the Transitional and one from the Soft/Applied discipline cluster) gave items such as 'creative/flexible thinker' and 'intellectual excellence'. Four PDFs (one from the Hard/Applied, two from the Transitional and one from the Soft/Applied discipline cluster) gave items indicating extent of leadership in field such as 'consistently involved in own research', 'good publication record', and 'seeking achieving external funding'. Three PDFs (one from the Hard/Applied, one from the Transitional and one from the Soft/Applied discipline cluster) gave another set of attributes which were to do with influence such as 'generally accepted by colleagues', 'professionally interactive' and 'a lot of influence within the department'.

Variation by discipline and gender

Although there are some variations discernible in the items just presented across the disciplinary clusters the similarity is more apparent. This is also true for gender on general items. However three of the seven women PDFs gave gender as a construct. The significance of this would require further investigation which was not possible in this study, but does indicate that there may be aspects of women's experience not yet being fully explored by studies to date.

Individual supervisory portraits

It is in the nature of general accounts derived from interview data that much of the very particular is lost, as is the interrelationships of specifics. It is therefore illuminating to look at the grids constructed by the PDFs as individual 'portraits' of their supervisors. It is an aspect of the repertory grid technique that supervisors can be rated on a scale of one to five for effectiveness according to the constructs established by the rater. Thus we have 13 'portraits' (one was incomplete) with the PDFs' rating on the supervisor's effectiveness for each construct and overall. Of the 13 portraits, using a scale of 1-5 to indicate effective through ineffective, 6 were rated 1-2, 1 was rated 3 and 6 were rated 4-5. The portraits and the ratings confirm the complexity of supervisory relationships. In all but one case (and even there, there is some gradation) the portraits contain positive and negative ratings of characteristics of the supervisor, yet in six cases the supervisor is still considered effective.

The following examples illustrate these points. In reading these examples it is important to note that each 'potrait' is idiosyncratic. Attention needs to be given to the descriptors (or constructs) as well as the graphic information. Figures 3.2 and 3.3 portray two examples given respectively by a male and a female PDF in the Hard/Pure discipline cluster. The first is seen to combine scientific competence with a lack of interest in the student and supervision. The second is seen to be an experienced supervisor who uses an unstructured approach, is distant but considered effective overall.

In contrast the supervisors of two PDFs in the Soft/Applied discipline cluster portrayed in Figures 3.4 and 3.5 are both rated as effective. Yet in the first intellectual excellence is not seen to be complemented by full personal support. There is a similar combination of factors in the second case but to a lesser extent. Figure 3.4 in particular would appear to exemplify a notion of 'trading off' eminence and support raised by the PDFs in general discussion.

Lastly the two examples in Figures 3.6 and 3.7 give a more ambivalent portrait (Transitional discipline cluster) and one clearly positive portrait (Hard/Applied discipline cluster).

Figure 3.2: Portrait of one Supervisor from the Hard/Pure Cluster

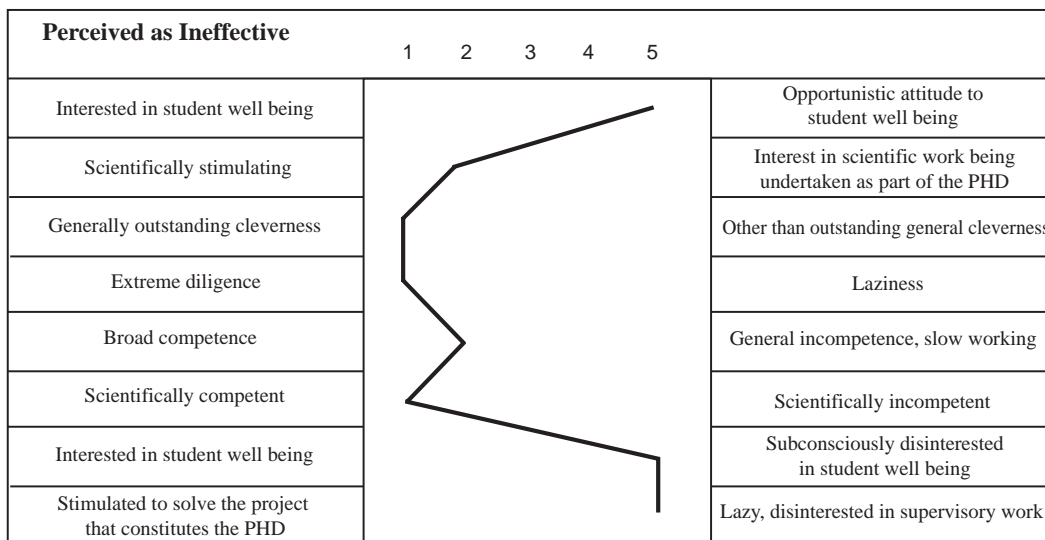


Figure 3.5: Portrait of a second Supervisor from the Soft/Applied Cluster

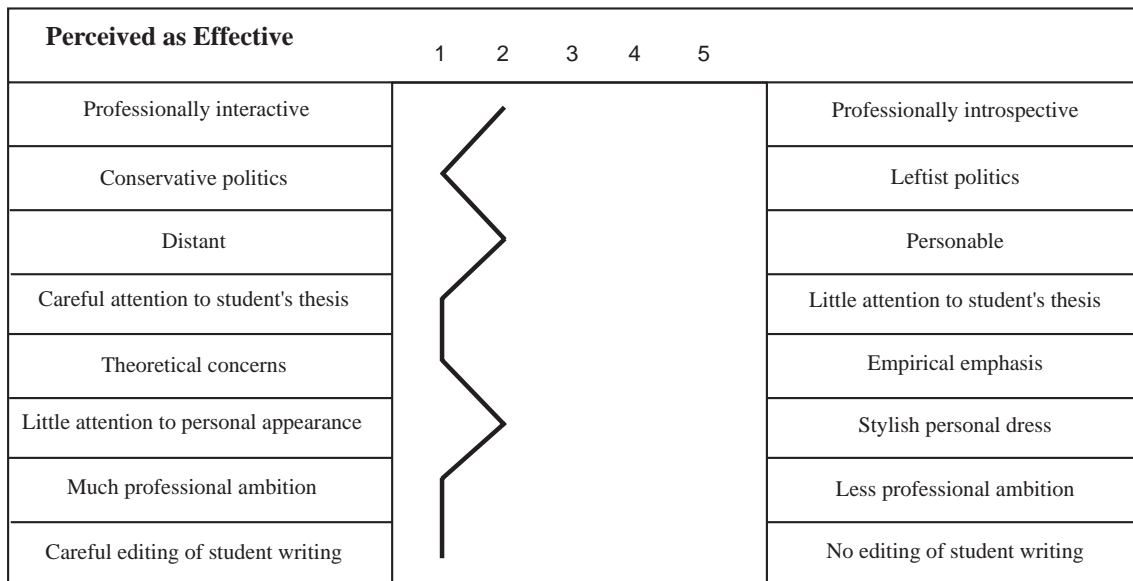
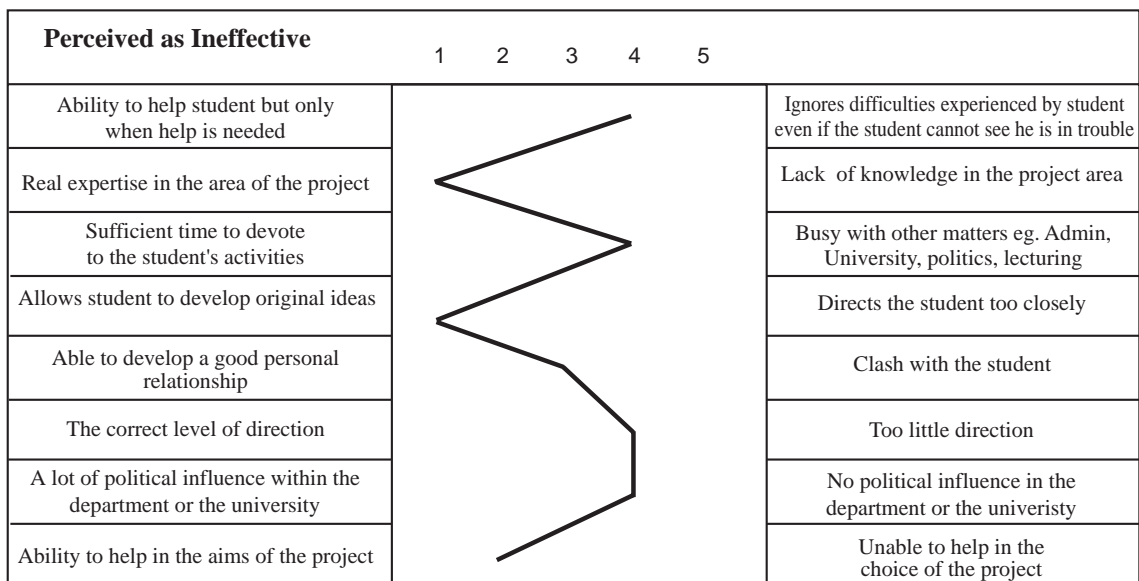


Figure 3.6: Portrait of one Supervisor from the Transitional Cluster



The PDFs elaborated on the positive and negative aspects of their experiences already referred to. Although all were successful students, they did have some stories of difficulties and problematic aspects of their time as PhD students. The overwhelming impression from listening to them was however that of groups of confident and self directed individuals best expressed by one woman who portrayed herself as very independent, reacting to a perceived lack of guidance by taking charge for herself and finishing in three years. She said she defined the task and decided when to finish.

The Process

The research process itself was seen as problematic. In hindsight some thought of how things could have been better organised but as one said '[you] start on a project but ... shifting ground (so) need to find a way to go and be able to change direction'. There are also constraints such as those of field work and the seasons which dictate what can be done. One PDF was chosen to work on a project where he 'wasted' the first six months using a technique which was incorrect. However he did find another process through contact with another department and completed the project. Another PDF tried to solve a problem which took longer than expected and so he had to redefine the project midway. Even more difficult was the experience of one whose problem was found to be non-existent after four years. He was judged on the results and now sees as an outcome learning how to surmount such an eventuality.

Outcomes

It is not surprising then that the outcome of PhD study was seen to encompass learning about the practicalities of research as well as the culture and the politics of the discipline and the academic profession. The PDFs saw themselves as learning 'a hell of a lot more than before', 'about how to design research', 'write papers' and so on. They saw themselves as learning 'self-discipline' and 'reliance', 'how to evaluate papers' and 'check the method if reliable'. There were the intangibles such as the 'diplomacy of how to deal with people and academic settings', 'discussion seminars (which) gave a feel for how things are going in the field which you can't get from doing things on your own', and 'how a body of knowledge is transmitted—books seem gospels but at a conference (you) get what is going on'. There were skills such as 'how to present ideas, learn the jargon, how to persuade people', because in 'some sciences (they) are on a plateau chugging along but in others they are developing and personalities are important, putting forward a point of view about something (would) not be so questionable'. Supervisors can help in suggesting 'readers of papers' as you the student constantly try to figure out 'what's what —what journal ... Playing politics, not opening mouth at wrong time—such things are important in academia'. A good supervisor teaches such nuances, one PDF summed up.

Of course reference was made to the concrete outcomes of the qualification, a book in one case, and career prospects in academia and industry for others. For one PDF from overseas

the point was made that the third world experience is different. 'You do a PhD and go home and serve some, then you are allowed out to do a post doc as a form of professional development then go back to a more substantive job in the home country'.

In two cases PDFs had had very negative experiences. One gave as an outcome 'postdoctoral slump', elaborated as 'depression of two years' and 'a lack of self worth'. The other said the process had been 'soul destroying' with a supervisor not able to explain anything technically.

Completing

Reasons given for finishing were pragmatic, such as the 'time (is) up', 'money runs out' (all PDFs), 'on a grant which was not much and wanted to get out', 'an accumulation of factors', 'need a PhD before coming to Australia', 'the air ticket was booked', 'set a deadline', and 'wanted to finish, had plane to catch'.

The amount of writing, timing of writing up and timing of literature searching was also seen to be a choice, partly depending on 'personality', or again on time available and fields. Two PDFs said they stopped researching and then wrote up, another one researched to the end because the 'stuff was changing and publications coming out all the time'.

The extent of prior publication and approach to thesis writing varied. Where they went into detail the view expressed was that the thesis was more than a collection of articles. One PDF 'individually published articles. (But) rewrote for more pedagogical style for thesis'; three published articles from conference papers which was a policy of the laboratory. These were a progression of experiments one out of the other but 'The thesis was more than the articles'. The self directed PDF mentioned earlier left time to write and enjoyed the last six months. As she said:

The thesis is not a paper, [it] includes what [I] did, what work, etc., and how I got around things. It is a synthesis of ideas.

Concerns were expressed in some cases with supervision of the writing up process. In one case the day to day supervisor after having got chapter one did not want to see it again until the finish. The reason for this according to the PDF was that the supervisor 'had been assigned and he had no interest and not his area'. In another case the supervisor had not read the thesis and there was a dispute over authorship. However another perspective was given by a PDF who said that 'Not many read it—my fault as (I) hung onto it. If do it again (I'd) get more to read it'.

Guiding, monitoring and support

The views expressed of this process focussed on the tension between getting enough support and being independent. It could be a 'Lone Journey', which it was felt some

supervisors saw as a 'rite of passage'. But while some were seen to need hand holding it was also seen that a student could 'be too looked after and not learn how to fight for yourself in the real world'. The analogy to parenting was used and the aim expressed as helping the students 'gracefully' separate. For an older PDF who had been doing research already the difficulty had been that 'I was already independent and there was friction in the process'.

The view that 'A lot depends on how comfortable you are with your supervisor' was given further meaning by one PDF who said it was to do with the particular 'constellation' for a particular student and supervisor—it was 'relational'. Advice on addressing the possible problems was to exchange and sort out expectations of the supervisor and the student at the beginning and review regularly.

Rewards for Supervisors

Supervision was seen as 'a demanding job' by the PDFs. The gains for supervisors were seen as papers, technicians, and a 'pair of hands'. In the last instance there was a discussion of the conflicting interests of the student to complete and the interests of the supervisor and the team wanting to get the work done. One PDF had had the experience of working in a research team and taking eight years to complete. He said:

The supervisor is doing this unconsciously and the student is getting credit but not getting a PhD. He had no defined outcome, no checks.

In thinking about the gain from the position now of being a researcher, he mused on the 'balance between training and getting cheap labour', and thought there was a 'need to think hard about it and whether the return is worth it. Will student be sufficiently good to get up the speed to be worth the effort?' A different motive for a supervisor was that of one who was seen to want 'disciples to spread the word ... and this came out in the revision of the thesis'. The idea that the relationship could be co-operative came from a PDF who chose a topic from a base line of data which belonged to the supervisor so that the work was complementary, but she worked independently on her topic. But again there was individual variation and one PDF said 'how it works out depends on the student once the topic is chosen and you get going'.

One aspect that was clearly a cause for variation and concern was the question of authorship of articles. Different experiences were mentioned. In one case a PDF had been told that a student publishing on their own was a 'bad' sign to the employer.

Supervisor Selection

As might be expected given the emphasis on learning outcomes which were additional to the research project itself, the selection of a supervisor was seen as very important. Students, it was suggested, are 'idealistic and have unrealistic expectations'. On reflection

the PDFs advised a proactive approach, choosing the supervisor carefully, reading their publications and ‘checking’ them out. Not that choosing was seen as easy. There were a number of factors raised such as:

Some supervisors are not able to guide students through a viable project and so the student is passed with low standards as people are reluctant to fail a student who submits.

Students need someone to point them in the right direction in a competitive market.

Students need a supervisor who models being a ‘good’ scientist, not those who are behind the times .

The educational component and getting a project completed are different from one another.

The student needs expert knowledge in science and methodology.

There could be something of a trade-off between eminence and supervisory support. It was pointed out that you could chose someone who has high research credentials, grants, awards etc. and was powerful, and with a good track record on supervision, but these did not always go together.

Got a supervisor who was expert in her chosen area and (did) not expect so much help.

Eminent people can be a disaster—not give much help.

Or there could be complications. One student related that he wanted a project to complete in three years. The supervisor wanted him to be independent. But the project turned out not to be sound and he, the student, had to reorient and in so doing became more involved in working with his adviser who was female, to the annoyance of his supervisor. This was difficult as he liked his supervisor as a person, admired him, found him intellectually stimulating and considered him well out in the field. He did not change the arrangements as he did not want to jeopardise the relationship.

A PDF from the US system advised choosing with care. He chose a mentor and got sufficient support. He was attracted to the supervisor’s theoretical position and he was powerful and able to help afterwards. The opportunity and filter to know all of this was coursework in the American system.

Institutional support mechanisms

A few PDFs commented on the need to have mechanisms in place to supervise the supervision process. There was the suggestion that there is a role for the Heads of Department to supervise what is happening and to intervene. The Head of Department was seen as someone remote from the PhD student and supervisor who could ensure completion. Another role was to ensure standards. This was seen as a particular problem by the PDFs as they were of the view that there were no failures at this level. Finally it was suggested that there was a need to define roles and responsibilities, particularly ‘what part of the job is getting out research or training students?’

The Student Perspective in Summary

From the diaries, it is clear that PhD student work habits show extreme fluctuation, suggesting considerable independence and autonomy. This is confirmed by the wide range in the hours per week which students reported spending on their thesis research, with the average being between 22 and 50. Students in these studies present themselves as at the centre of a constellation of others. They appear as self-organising agents of varying effectiveness, accessing resources, one of which is the supervisor. Others are technical staff, other students or academics with particular expertise, and of course financial support for themselves and their research. Moreover, where the initial problematic aspects concern theory and methodology, students may need to find the appropriate source of supervision. They need skills of negotiation to navigate their candidature. And as the emotional intensity with which these students respond to the challenges of the PhD process varies, they need resilience.

What are the students learning? From their own accounts they are learning:

- technical competence—extra skills such as computing;
- techniques for analysis;
- the logistics of research—getting together the resources which can include equipment, technicians, documents and so on;
- self-management particularly for juggling responsibilities and time—learning how to make decisions about what to do and when to stop;
- how to mix with other academics, give papers and be part of a culture as a colleague.

Their independence in work habits is reflected by the relative invisibility of supervisors in the diaries: most of the activities reported by the students related to matters other than supervision (34 references to supervisors and advisers over 117 weeks of diary entries). However, supervisors are key ‘others’ in the constellation. The PDFs, who were specifically asked about supervisors, particularly gave insights into the range of ways in

which supervisory assistance could be helpful and at times critical. In their reflections on their own supervisors, current postdoctoral scholars focussed on four dimensions of supervisory quality which included both personal style as well as academic competence:

- supervisory style;
- supervisory competence;
- personal characteristics; and
- academic reputation (centrality in the department and the discipline).

In their general discussion of their experience the PDFs extended the meaning of these dimensions, raising issues to do with supervisors' technical skills, the structure within which the PhD research could get completed, and the introduction into the professional subculture of academic collegiality and individual personal factors. Their discussion underscored the extent of individual variation which appears to override any disciplinary differences. This variation is a product of individual differences and student/supervisor interactions. It indicates the need for caution in deriving strategies and advice for good practice from generalised descriptions which mask the complexity and may not be useful as ground from which to proceed with a view to improving practice.

Notes

¹ The technique, the repertory grid, and personal construct theory is not germane to this report and will not be explained further. However more about the technique is available in Phillips (1980) and Diamond and Zuber-Skerritt (1986).

4. VARIATIONS IN STUDENT PERSPECTIVES

Towards the end of the study a questionnaire was distributed to all students enrolled for the degree of PhD at the ANU. The questionnaire was prompted by the study's preliminary findings—derived from the results reported in the previous chapter and from the series of interviews with experienced supervisors reported in the next chapter. A copy of the survey instrument and an analysis of the demographics of the response population are contained in Appendix E. Breakdowns of the responses to each question by the students' ages, genders, national and linguistic backgrounds, commencement year, supervisory arrangements and disciplinary clusters are contained in Appendix G.

The following aspects of the results of the survey of all PhD students are considered in this chapter:

- Student perceptions of the number of supervisors and advisers who they have and the modes of supervision and advice which are adopted by their supervisors and advisers.
- Student perceptions of the elements of structural supervision such as seminars and reading groups.
- Student perceptions of the effectiveness of their supervision overall.

Supervision Arrangements

Respondents were asked to indicate the number of advisers and supervisors who were on their supervisory panels. The results are summarised in Table G.1 (Appendix G). On average, students have 1.7 supervisors and 1.3 advisers. There are few significant variations with respect to the independent variables. Women tend to have slightly larger panels with more advisers but no fewer supervisors. Overseas students tend to have more supervisors and fewer advisers, although overall their panels are essentially of the same size as those of Australian students. The overall size of the supervisory panel is larger for students in the Transitional discipline cluster. Not surprisingly, perceived panel size, and in particular the number of supervisors, increases as the panel arrangement moves away from the 'essentially one supervisor' to the 'more than one supervisor' model.

Respondents were asked if they received significant supervision from non-panel members. The results are summarised in Table G.2. 25 per cent of the survey sample indicated that did receive significant supervision from non-panel members. There were no significant differences with respect to age or national and linguistic status. On the other hand, students towards the end of their PhD (those who enrolled in 1990 or earlier), students in the Transitional discipline cluster and students with more than one official supervisor receive more supervision from non-panel members.

Respondents were asked to describe the group dynamics of their supervisory interactions with their supervisory panel by indicating which of the following seven statements best described the group dynamics of their supervisory interactions:

- a) 'I get no supervision from anyone';
- b) 'In essence I really have only one supervisor';
- c) 'I have one principal supervisor and I see the others only at formal panel meetings';
- d) 'I have one principal supervisor and I see the others when I need their particular expertise';
- e) 'I see more than one supervisor and/or adviser regularly for general supervision';
- f) 'I see all my supervisors and advisers regularly for general supervision'; and
- g) 'Other'.

The results are tabulated in Tables G.3 and summarised in Table G.4 where the seven response categories have been condensed to three: essentially one supervisor—response categories (b) and (c); one supervisor plus some advisers—response category (d); and more than one supervisor—response categories (e) and (f). A significant number, 24.9 per cent, of panel arrangements are still along the single supervisor model. Most students, however, see more than one academic for supervision or advice and 27.2 per cent of students see more than one academic regularly for supervision. Older students, female students, and overseas students are all more likely to see more academics for supervision and advice while younger, male and Australian students are more likely to be involved in single supervisor arrangements. Students from the Hard/Pure discipline cluster are also more likely to be involved in single supervisor arrangements.

Other Activities

Students were asked to indicate what other academic activities—for example informal reading groups, seminars or conferences—they took part in. Results are summarised in Table G.5.

86.7 per cent of students attend informal seminars or reading groups in their own department and 60.8 per cent attend similar sessions outside their own department. Students for whom English is not their first language are more likely to attend such sessions while students from the Soft/Pure discipline cluster are less likely to attend such informal sessions.

98.0 per cent of students attend formal seminars in their own departments and 80.6 per cent also attend formal seminars in other departments. Overseas students are more likely to attend formal seminars and students with more than one supervisor are more likely to attend formal seminars in other departments.

73.8 per cent of students attend student seminars organised by Graduate Programs. Women and students for whom English is not their first language are more likely to attend such sessions. Students from the Hard and the Transitional discipline clusters are also more likely to attend student seminars while students from the Soft discipline clusters are less likely to attend student seminars.

31.4 per cent of students attend staff seminars organised by Graduate Programs. Students whose first language is not English are more likely than their fellow students to attend these sessions.

40.9 per cent of students attend other Graduate Program activities. Older students, students whose first language is not English and women students are all more likely to attend such sessions. Students who have more than one supervisor and students from the Applied discipline clusters are also more likely to attend other Graduate Program activities.

79.9 per cent of respondents had attended a conference in Australia and 33.1 per cent had attended an overseas conference. Overseas students are more likely than Australian students to have attended an overseas conference.

Sources of Assistance

Students were asked to indicate if they had received assistance from any of a number of listed sources including: other students, academics, technicians, administrators and support services. Their responses are tabulated in Table G.6. Students were also asked to indicate if the help which they received from these sources was perceived 'critical' by them to their continuing their PhD. Their responses to this question are tabulated in Table G.7.

Women are no more likely than men to seek assistance from other students, academics or technicians. They are less likely to seek assistance from members of the academic hierarchy (Heads of Department and Faculty Deans) but more likely to seek assistance from the Graduate Student Administration. They are also more likely to seek assistance from the Study Skills Centre and the Counselling Centre and to seek assistance from other sources. Although women are no more likely to seek assistance from other students, academics or technicians, these contacts are more likely to be 'critical' to the student's continuation. Similarly their rarer approaches to the academic hierarchy are also more likely to be seen as 'critical'. Not only do they approach the Study Skills Centre and the Counselling Centre more often, these approaches are also more likely to be seen as 'critical'.

Overseas students are more likely to seek assistance from other academics and technicians. They are also more likely to seek assistance from members of the academic hierarchy—for example, the Faculty Dean and the Graduate Program Convenor. They are also more likely to seek assistance from the Study Skills Centre but less likely to seek assistance from the Counselling Centre and Other sources which are likely to be informal support. Not only are overseas students less likely to seek assistance from Other sources, such assistance is less likely to be seen as 'critical'.

With an increase in the number of supervisors, students are more likely to approach the academic hierarchy, the graduate student administration, the Study Skills Centre and the Counselling Centre. Students from the Hard and Transitional discipline clusters are more likely to seek the assistance of technicians while students from the Soft discipline clusters are more likely to seek the assistance of students and academics in other departments.

Effectiveness of Supervision

Respondents were asked to rate the overall effectiveness of the supervision that they received at the ANU on the six point scale: Excellent, Good, Satisfactory, Less than Satisfactory, Bad and Disastrous. The results are tabulated in Table G.8. The questionnaire was structured in order to direct the student's attention to all aspects—individual and institutional—of the supervision which the student was receiving at the ANU.

Overall 84.8 per cent of students report satisfactory or better supervision, only 5.2 per cent of students report bad or disastrous supervision. Interestingly students who have been on course for longer and students with essentially only one supervisor are more likely to report less than satisfactory supervision. The effect is strongest in the case of students with only one supervisor. Of these students, 28.6 per cent report less than satisfactory supervision.

In two previous studies at the ANU—an exit survey of completing PhD students conducted from 1985 to 1989 and a survey of all PhD students conducted in 1987—27 per cent and nearly 30 per cent, respectively, reported supervision problems (Cullen, 1989, p. 93). The difference reported can in part be explained by the current survey's concentration upon the institutional, as well as the individual, aspects of supervision.

The current survey also sought data on the student's satisfaction with each active member of their supervisory panel. Tables G.9 and G.10 respectively tabulate the minimum and maximum responses for each student. The responses to these questions are more in line with the previous research. 32.6 per cent of respondents have at least one supervisor whose effectiveness is perceived by them to be worse than satisfactory. On the other hand 81.1 per cent of students have at least one supervisor whose performance is perceived by them to be better than satisfactory. The best predictor of overall effectiveness is neither the minimal nor maximal individual effectiveness, however. The correlations which obtain between overall effectiveness, best supervisor's effectiveness, worst supervisor's effectiveness and average effectiveness of supervisors are as follows:

- 0.71 (between overall effectiveness and average effectiveness)
- 0.63 (between overall effectiveness and best supervisor's effectiveness)
- 0.58 (between overall effectiveness and worst supervisor's effectiveness)

The improvement in satisfaction is not simply an artefact of the new approach of the current survey, however. The panel arrangements for supervision in place at the ANU appear to have a significant effect in improving student satisfaction. Of those students who have essentially only one supervisor, 40.3 per cent report supervision which is good or excellent. Of those students whose panel consists of one principal supervisor and one or more active advisers, 67.1 per cent report supervision which is good or excellent. Of those students who see more than one member of their supervisory panel regularly for general supervision, 78.3 per cent report supervision which is good or excellent. Moreover these results do not vary significantly across disciplines clusters. It is particularly striking that 71.5% of students with 'essentially one supervisor' report that their supervision is satisfactory or better, whereas the corresponding number for students with multi-persons supervision is higher than 90%: 93.1% for those with 'one supervisor plus advisers' and 91.6% for those with 'more than one supervisor'.

In summary

The survey results indicate that the majority of the students responding to the survey were satisfied with their overall supervision, only 5.2% reporting bad or disasterous supervision. Moreover students receiving supervision from more than one supervisor indicated higher

levels of satisfaction. The survey results also indicate that students distinguish between the level and quality of supervision provided by their individual supervisors, and the overall quality of supervision which they received from all individual and institutional sources. The single most important determinant of satisfaction with overall supervision was not satisfaction with the efforts of individual supervisors, but the size of the active supervisory panel. Students receiving regular supervision from more than one supervisor indicated higher levels of satisfaction with overall supervision.

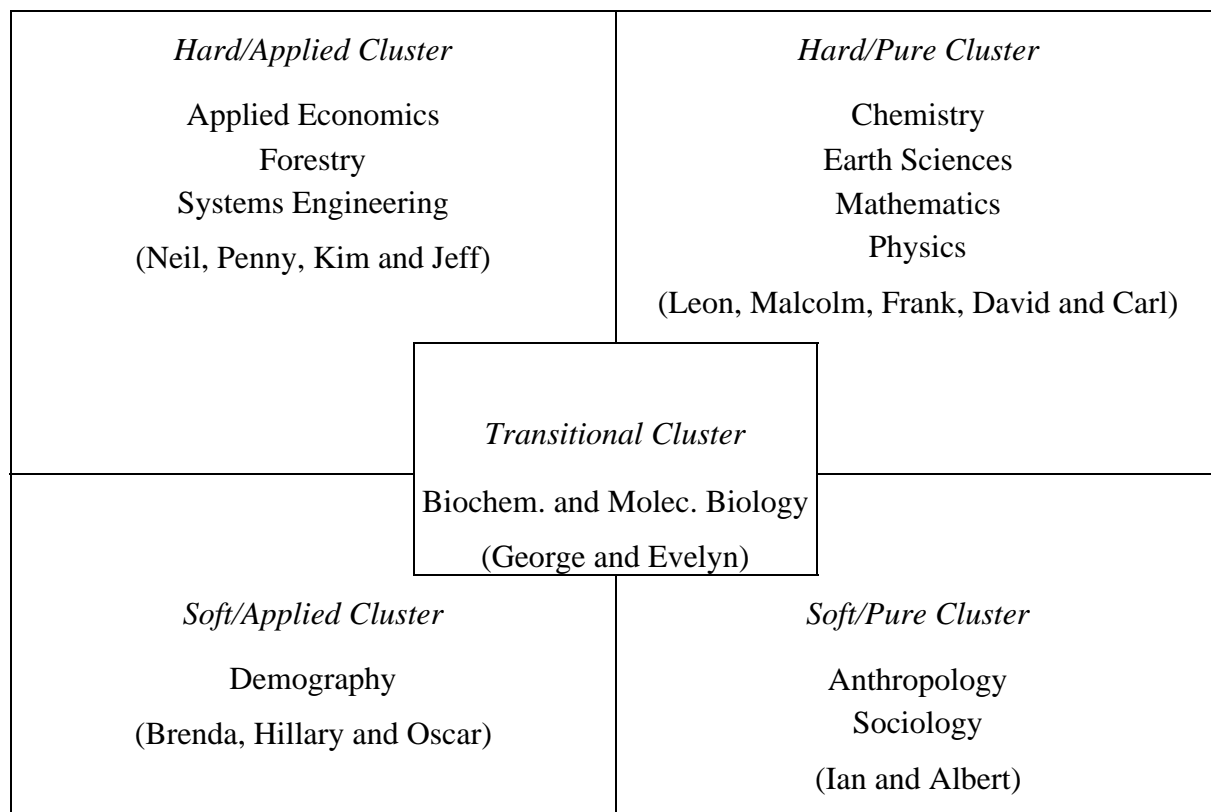
In the previous chapter we found that students presented themselves as self organising agents. The results of the survey confirms this as a common picture. There is wide variation between PhD students in the ways they use other resources, which again suggests considerable independence and autonomy in the ways that students organise their day-to-day PhD research activities. The ranking of sources of assistance according to frequency of use established in chapter 3, however, was confirmed in the survey in table G.6. Other academics and students in particular are indicated as the most important sources of help. While the variations may mean variations in opportunity, an aspect which was not explored in depth in the survey, there are interesting variations. Particularly women students are more likely than their male colleagues to make use of support services such as the Counselling Centre and the Study Skills Centre. Overseas students are more likely than their Australian colleagues to seek assistance from administrative structures, eg. Program Convenors, department heads and the Graduate Students Section. They are also more likely to seek such assistance from the Study Skills Centre, but not from the Counselling Centre.

Aside from these important differences the apparent homogeneity of the student experience was striking. The demographics of the student population appeared to have little effect upon their PhD experience. The effects were certainly less striking than those of the demographics of the supervisor population examined in Chapter 6.

5. SUPERVISOR PERSPECTIVES

This chapter is based on a series of semi-structured interviews held with sixteen experienced supervisors at the ANU. The supervisors were chosen from the five discipline clusters by virtue of reputation and extent of experience. An effort was also made to include women—four of these sixteen. Figure 6.1 displays the distribution of the interviewees (the names are fictitious) across the disciplines. The supervisors’ collective experience includes being supervisors, students and examiners at and for institutions in Australia, Europe, the UK, North America and Asia. Individually they had supervised varying numbers of students, the largest number claimed by one person was over 50. Many have and are supervising honours and masters students as well.

Figure 5.1: Interviewees by Discipline Clusters



In the interviews the supervisors were asked to reflect on the outcomes and the process of their supervision, and their experience in general. A copy of the interview schedule is

contained in Appendix D. This exploration was expected to assist in identifying the critical elements in the supervisory process and strategies for effective practice. In particular we sought to find out what was common and what was particular for different discipline clusters and students.

The Supervisory Process

The process described by the supervisors interviewed had common elements, but variations according to the nature of the discipline and the research task. The following examples give an indication of that commonality and the variation:

Albert, an academic from a Soft/Pure discipline, indicated a clear pattern at beginning and end. He expected supervisor initiative at the beginning moving towards student initiative and saw as critical getting the question right.

That initial stage involves little bits of paper going backwards and forwards. I'll sit them down and talk to them and say how this is done. They'll talk to me and I'll say, 'Now that sounds that you are trying to answer this question. Is that right?' and they'll say yes or no and I'll say go away and write it down and bring it back to me and then we'll have another look at it. I might get three or four efforts at the question from them in the first few months so there is a fairly intensive process going on there. Then the intensity slackens off and we see what happens. Sometimes they want to write work in progress type papers. In fact that's what often happens. They will present a seminar to a Department or a couple of seminars. They will be work in progress papers which I would read prior to the finalising. ...

But then the work picks up again when they start to produce chapters and when they are producing chapters I then read and comment on them. ... Some students like producing chapters very early. ... I wouldn't encourage them to start writing chapters which they see as even draft chapters until say eighteen months have gone, because once someone has a chapter, even if it is called a draft chapter, they are not going to change it significantly. ...

One of the things I say at the beginning is. 'How often we see each other is up to you and to me', and we sit and talk about what our expectations are and what we'd like and I say that I will be making the running in the first few weeks and insisting on seeing them fairly frequently and after that as far as I'm concerned the frequency can drop off to once a month. However, if they want to increase the frequency that's up to them and we've got to talk about that. So I suppose what happens is after that initial period it does become a once a month meeting. When I am not reading material, I'm just talking to them about their progress. Either way there will often be some administrative things to sort out. If there is field work there will be administrative

issues, so a once a month meeting has some function in that respect. It may run for two months at times over Christmas. ...

Then we gear up again with the chapter outlines and it is a bit more intense until that is sorted out and then it is up to the student again and I just read the material ... the chapters as they come in.

I think I have become more assertive over the years. ... I was very tentative initially and I didn't insist on things. Now I insist on things, I insist that they have a question because I've learnt from bitter experience that that is necessary ...

For Carl, an academic from a large equipment based discipline in the Hard/Pure discipline cluster, the student is under direction for up to the first twelve months, but out of this the student chooses their own question or subject. The student works on this, leads their own team and then in nine to twelve months does the analysis and writes the thesis. It is important that the student selects their own question rather than it being imposed.

We usually get students that arrive here and for the first twelve months we involve them in what we are already doing and that usually means they're doing work that I'm interested in. That might include several different topics. Over that year we try and spell out to them how each of these fields of research might develop and how I'd like to see them develop. At the end of that year they're usually in a position where they themselves do say, yes this is the field of interest [that I [the student] want to pursue] and it's those particular types of developments that have been spelt out that I [the student] am interested in pursuing.

From that point forth the student—he's never isolated or independent, the door's always open, he walks in as often as he likes—then really takes on the responsibility of pursuing that. So he's the leader of the team if you like from then on. Now we have weekly or fortnightly meetings, and we discuss how their things are progressing, and how to do things differently. So where experience matters about techniques, he gets all the advice necessary. But in actually determining what should be done he is the group leader. And as he gets more experience he decides how to do it as well. I think that's what I've always tried to do with the students. The aim is to try and make them choose the subject. This guarantees their interest rather than imposing something on them. ...

I would say any student who thinks he can write a thesis in under six months, even if he has analysed all his data and understands all the results, he is doing very, very well. For the analysis and the writing, I try to aim for twelve months.

David, an academic from a non-equipment based discipline in the Hard/Pure discipline cluster, has a pattern which is to start something fairly structured and concrete by giving a problem that is accessible and then leaving the student to define it.

It depends a lot on the student that you get. You get students [whose] background is not strong or not ... especially strong in the area that they are going to work in. Or it might be quite strong but they're very diffident, which is quite common. It's important to start students like that off with something fairly structured and concrete. Now it might be asking them to attend a course, or it might be asking them to read in some area or other. Usually, in cases like that, I would expect the student give some seminars on the topic and talk about it, preferably in a group if it can be organised. To try and make it their own, you know. It's good if you can find a little problem, well little, you know in inverted commas. A problem that is accessible and they ought to be able to do in a couple of months when they've got some mastery of the topic. [The problem] may or may not form part of their actual thesis. It may or may not be publishable. You've got to get them to a point where they feel some confidence in being able to take something on and not be put off by the open-ended nature of the problem. Or even by the fact that its really up to them to define the problem. ...

There is no formula for [supervision]. There is a strategy in supervision. There is a range of techniques and tactics that you can provide. I mean there is a time to get students to read things and there's a time to tell them to stop reading. Reading can become a drug with some students. ... On the other hand, you can get stuck in a problem and you've reached or got well beyond the point of diminishing returns. The chances of that line, that tack, producing any success is remote. Then it might be that reading around in a lot of literature is called for to see if you can dig up some new idea. It might be that you've got to intervene yourself if you can find or think of anything.

I think, one thing that you can actually do is to send them away on a holiday for a week. That's not a bad idea either on occasions if you can contrive that. There's all sort of peripheral things. I think its important for students to do a bit of tutoring or other work that is not solely, which is not connected with their PhD work.

Evelyn, an academic from the Transitional discipline cluster, stressed a need for focus in the beginning. The supervisor could discuss and formulate some general questions but the student has to do what they want to do and to stick at it for three years. The supervisor should steer them away from what is not feasible or viable.

Well, obviously you need in the beginning to have a lot of discussions with the student about the actual area they are going to concentrate on and I think you will try and formulate some kind of general question which the student will address in their research project. Now this may well change as the project goes on but I think you

need a certain amount of focus in the beginning. ... The student will then go and do a fair bit of reading. You will direct them towards the right reference area. They'll read all sorts of stuff. They may come back with a whole range of different ideas. You would help the student in sorting through those, what would be likely to be feasible and what weren't from your greater basis of knowledge. ...

In the long run, it's really what the student wants to do cause they've got to stick at it for the next three years but you would hope to very much guide them into something that was reasonable. You know that they weren't backing up some alley that somebody else has been trying to solve the problem for 20 years and hasn't managed it—you know with the sort of 20 million dollar input. You would steer a student away from doing anything like that because their chances of success would be negligible ...

I think good supervision is when you have a close relationship—a close professional relationship—with your student in that they come and talk to you a lot, they sound out a lot of ideas as they're going along and they do things in a way which enables you to help them as much as possible.

Jeff, an academic from the Hard/Applied discipline cluster, begins giving small tasks and then moves to let the student get an accurate feel of their own abilities, 'like a parent'.

Before I take on the student I would be saying to him or her ... look these are the problems I'm working on, I'm particularly interested in this sort of thing. What do you think? ... Would you like to do this sort of thing? And, so, I get some feeling of desire from the student that they want to have me as supervisor and work on a certain problem. I mean there's two things: there's the person and there's the problem. And the particular problems I have might not be quite what the student wants. ...

So, we establish that we want to work together and then the first thing that happens is I would give the students several papers and say the thing I am trying to do right now is this. ... So read this, read this, read this and then come and have a chat. So we have a chat and then I say, well now, would you like to try to prove this theorem, would you like to try a simulation, would you like to try a trial design using the package bound by the conjecture. So you give them some small task ... It's important to define the first few tasks to be suitably small so that the person isn't overwhelmed. ...

The hardest thing for me is to know is how much to leave to the student and how much to do myself after a year or two years. See the student is very comfortable, they have lots of help to begin with and then, like a teenager, he or she wants to do his or her own thing. And like a teenager he can't always. So, then, you know, as the parent of the student or the teenager, I don't have perfect judgement either. So you can help

a student too much and then he may be a bit frustrated that he, you know, hasn't had the chance to really do his own thing. Like the teenager wants to do their own thing. And when there's a time pressure, you can let the student run with the thing so long and then he's not making much progress and so sometimes I just whale in and, you know, take charge. I say, this is the way you've got to do it and then I actually do it. So that's disappointing for the student.

So, judging how much intervention after the student has come along and wants to do his own thing is tricky ... how long do you let them run so that they get an accurate feeling of their abilities. You know its perhaps important for them to have the experience for six weeks or two months or something to show them that they're not that good at choosing, you know, a problem and that they've been over-reaching. So judging these interventions, judging these intervention points and all the time you're making those judgements when you can never guarantee 100 per cent accuracy in your assessment of situation.

Oscar, an academic from the Soft/Applied discipline cluster, begins with assistance, literature, context, establishing the thesis proposal. There is more activity at the mid-term review and in the final stage of reading material produced by the student. Oscar prefers to leave students to be independent but notes that some like a timetable.

There are all different styles. There are supervisors who like to make weekly or fortnightly appointments with people but I don't do that for a number of reasons. Time is the most obvious one, but, my time. The real, I mean the essential, reason is that I think by the time someone is doing a PhD, they shouldn't need a weekly appointment to keep their nose to the grindstone. They have to be self-motivated and if they're not self-motivated, then the thesis is not going to be a success.

Early on I would spend more time with the students than later, informally. I mean once again it is hard to generalise because it is very topic specific. And it will make a difference if there is data to be collected or not. But I would spend more time in the beginning just trying to home in on the topic, to assist the student with reading and pushing literature at the student. I'm also trying to think of other people that the student should talk to. If I have a student working in a particular subject area and it strikes me that a colleague somewhere else or a friend somewhere else is doing, or once did, some work in this area then I may get in touch ... The contact [with the student] ... would be more intense earlier on ... building up to the six month 'making the thesis proposal'.

Very different if there's going to be field work than if there isn't. And once again that can mean quite a lot of intensive consultation with the student. Because the student is going to be off on his own and all hell can break loose ... It tends, of course, then to

get much more intense towards the end also. Often the middle of the thesis seems to be a sort of fallow period, you know there is activity going on but that activity will heighten around about the time of the mid-term review ... then you get, once again, a flurry of activity towards the end naturally ... it depends very much of the personalities of the students too. And there are, unfortunately, there are students I think who have benefited, who actually benefit from a timetable style of supervision. There are also students who loathe it. And its the same for supervisors.

The Importance of Focus

Although the way a student chose their topic, formulated it with their supervisor or was given an initial project, varied according to discipline, it was clearly a critical element. The emphasis on the student formulating a topic which is feasible has been identified before as important in ensuring completion. Phillips refers to both Arts and Science students doing this despite differences in the way they start their research:

The more highly structured introduction of the science students and less highly structured introduction of the arts students, made no difference to the fact that all the postgraduates had to isolate a particular problem, with clear boundaries, as their own specialised topic. Phillips 1981,p. 96)

The significance established by the interviewees is to do with motivation, and outcomes such as the quality of the thesis and the development of the student as an independent researcher. As Evelyn said ‘they’ve got to stick at it for the next three years’; or as Carl put it ‘the worst thing is a student to write a thesis without conviction’.

The students also need this commitment if they are to produce a thesis which contains ‘new things worth saying’ as one interviewee (Malcolm) summed up his expectations. For in response to the question on what you look for in examining a thesis, 13 of the interviewees (which included at least one from each cluster) displayed considerable unanimity. There were differences in supervisors’ views on presentation and the extent to which a thesis should be up to publication standards, but strong agreement on three elements:

- originality of data or analysis of the data;
- coherence of argument and presentation; and
- competence in analysis: technical, conceptual, and contextual.

The last competence, contextual, referred to the ability to put work in perspective, suggest future directions and involved for two supervisors (Albert and Hillary) an integrated discussion of the literature which related it to the purpose of the research.

Originality could be expressed in varying ways. Where students are working in a team as in science, there was reference to the need for a ‘spark’ which indicated that the student had taken initiative (Leon). Others stated that the thesis should have a ‘question not adequately answered before’ (Brenda) or a central question looked at from different angles such as:

Looking at what made the specificity in a certain microbe and the way it interacted with a plant and they looked at it from the point of view of looking at it at the molecular level to look at the actual sort of base pair matching and how it was different from other things. They looked at it how it interacted with the plant and they'd looked at the various signalling. So they'd looked at about three different stages or the problems from three different angles and this a very satisfying thesis to mark because they'd obviously thought about the questions and they'd also thought about constructing the experiments very well and that was good (Evelyn).

Another example of originality, quality of analysis and the carrying of an interesting idea through was as follows:

[In contrast to] doing what I consider fairly boring and straightforward quantitative studies where you set up a hypothesis and do your data analysis and establish or not establish it ... for instance I've got an ... student who's about to finish now. She wanted to do a study of why women work in ... and she thought that the way to do this is to run around and ask them why they work. She discovered that, in a sense, it's a silly question. Certainly if you go around and ask them why they work or why they don't work, they can give you some sort of an answer but what it really means in terms of whether they ever had a real choice about what they did or what they didn't, whether they thought about it at the time or whether they just kind of ended up in a situation where they either did or they didn't. So then she went back to the field again and, in fact, three years later to do qualitative work. To try and examine these sorts of issues in much more depth and so her final thesis is both, in a way, it's an evaluation of whether you can ask that question or whether it's a silly question. It's also a methodological study because it's looking at the different ways in which people have collected information about this and an evaluation of those methods (Hillary).

Outcomes

The importance of the topic and focus are also related to supervisors' expectation of the benefit and outcome of PhD study. Students were seen to have an unique opportunity for: 'A period of totally directed, self centred experience' (Oscar). Other academics expressed the point differently:

They get the chance to plan and execute a long term body of work in one area and there is no guarantee now I think with research funding and with more user pays directed funding that they may be able to do this at another time in their life (Evelyn).

It's the one opportunity in your life really as a researcher to really go into depth in a particular area and, at the same time, hopefully, build a foundation for a great deal of your future research career. Because while you expect the student to go into depth in their own particular little area of the discipline you also require that, you know, they have a solid foundation in the discipline as a whole and that they're able to see

how what they're doing fits into the wider picture and I think it's probably, ... is the foundation of a research career (Hillary).

This opportunity was seen to be important as an experience in its own right, building the confidence that comes from having authority, and being enjoyable intellectually (Kim and Evelyn). It was described as an 'investment' (Albert), developing 'intellectual capital' (Neil) for the future for those who become researchers and for those who go on to other careers. It is this notion of capital which extends the idea of the PhD as a qualification or ticket for academia or for other careers. Some supervisors, including science disciplines, expected many of their students to go into government and industry positions where they would be users of research rather than generators, but still saw the experience as worthwhile (Leon and Malcolm).

What the outsiders look for is initiative, outside the chemical area, just employing a PhD as an educated person. ... you really want someone who can look after themselves in a competitive environment. Get information, build up a bit of a network, generally be a bit active and get out and do things (Leon).

Another extension is to recognise the importance of socialising students into a profession, building contacts as well as skills.

We have a goal of producing PhD qualified students who can play a part either in industry or a government lab or as a university academic and we believe it's very important that they do more than just write a thesis. So we expect to educate them more broadly than simply a thesis would do and that involves requiring course work. We also try and have them work with more than one person during their three years. That would happen to the extent of writing a joint paper, probably two thirds. We believe we have to teach them communication skills and so they're required to present seminars which are video-taped and given feedback if required, to make short presentations to visitors. We think they need to be socialised into the R&D profession which has an industrial component as well as an academic component. And to that end we send them to conferences and we outplace some of them in the industrial, R&D labs for one or two months. They also get exposed to a lot of visitors, which is a part of the broadening of socialisation process. So what the supervisor does is just one of the components in the training of the student (Jeff).

This consideration for the future was echoed in the discussion of choosing examiners. It could be done with the student's career interests in mind giving them strong referees for their first job (Albert). Just what the first job would be was not so clear. While the supervisors were agreed that the PhD was good research training, there was some difference as to the level achieved. Some thought students were now ready to do a range of things in their area:

I guess apart from any specific knowledge of the field, I think the general things are to be able to think about problems critically and that's, I think that only a proportion of the students who do a PhD, say in my area, will end up being employed in that area. So, and I'm conscious of that fact, so therefore I treat the PhD as period during which the student will learn how to think and how to analyse problems, how to read about problems, how to communicate what they've found, because I think, I treat, I probably give more emphasis to that than some people might. I think it's an essential aspect of research is not only to do the research but to be able to communicate the research (Malcolm).

Others thought students would now need to go on to a postdoctoral post for a research career. One supervisor was comfortable with students going on to do research but not directing graduate students (Jeff). Even where one supervisor saw the student as ready to continue original research, he qualified this by referring to the 'slightly protected position' of PhD students (Frank). Where mention was made of teaching (Albert, Evelyn, Ian and Penny) two had the view that PhDs did not prepare for that duty; another saw coursework giving that preparation.

Completing

Just as it was considered important to set the process up well, so ending the PhD process had its own special characteristics. A question to the interviewees about knowing when it was time to submit was designed to elicit how much responsibility students were given at this point as an indication of the degree of recognition of them as having become independent and expert researchers. In the responses there was a range from those who felt the student should have the final say, even if the supervisor disagreed (Albert) to those who saw it as a joint agreement dependent on a 'feel' that it was time (Brenda and Carl) through to a supervisor who said categorically 'mixture of skill ..., time available, how much and what quality achieved; I guess whether I stop at the first target ' (Malcolm). Whatever their position all supervisors saw themselves as having some responsibility in bringing the PhD program to a close.

It is at this point too that students have to be encouraged. Some want to stop, particularly if they have reasons such as a job to go to, but others can be stuck and the problem is at this point acute. An interventionist approach may be necessary (Kim).

In addition the production of a thesis was seen as a separate task and writing a thesis of quality distinguished from doing a good piece of research. Even though some supervisors spoke of the practice of encouraging students to put 'everything in writing on the way that can be incorporated, even the mid-term review can be a draft ' 'writing up' the thesis was a major exercise in its own right. One supervisor stated that 'often the first draft is no good'. He talked of having to 'coax it [the thesis] up' (Ian). Another referred to the difference

between how 'you write it up' and 'how it [the research] proceeded' (Hillary). In this case he talked of a case where the student had a thesis but 'hadn't written it out'. A problem for students he suggested was that in some cases what they produced was:

... not a thesis, it doesn't have an argument, it doesn't hang together and go in a particular direction and what I find is that there is a big difference between the work that you do and the thesis that you write in most cases, or the thesis that you ought to write. Because you do a body of work in a certain order because that's the logical way to go about it and students almost universally tend to write their theses as kind of a story about what they've done, which is not necessarily the way that it needs to come out because you do the research in order to discover something and, depending on the type of research that you're doing, you very often don't know what that's going to be at the outset (Hillary).

It is in writing up the thesis that overseas students were seen to be more likely to have difficulties (five academics commented on this).

Guiding, Monitoring and Support

Supervisors saw the process of supervision over time ideally as a process of handing over responsibility for the research to the students as they gained confidence and became more independent. There were many strategies for guiding and monitoring students mentioned to assist in this process such as using student seminars (Brenda), mid-term reviews, plans and timeframes, and co-authoring papers for conferences and publication (Carl).

Knowing when and how to intervene was seen as a difficult judgement. One supervisor said that it was easier in retrospect to see the signs that someone was having problems. He suggested that it was sometimes the student who was working incredibly hard but making no progress who was in difficulty (David). Other signs were missing meetings and not handing in any writing (David, Albert and Oscar). But that depended in part on the nature of the work being done. It is often said that bench work disciplines have fewer problems because of the day-to-day interaction. However one supervisor from such an area distinguished between propinquity and interaction and had a system of meetings and reports for supervisory purposes in addition to daily sightings (Malcolm).

Where students are in serious difficulties and look as if they may not finish—some supervisors had not had this problem—supervisors reported strategies such as breaking the tasks down into manageable steps, clarifying timeframes and imposing deadlines (Brenda, Evelyn and Gorge). These strategies have to be used with care as the underlying problem can be poor self esteem and lack of confidence (David and Jeff). One supervisor used mid-term reviews to bolster confidence but another reported using informal ad hoc groups for difficulties and keeping seminars and mid-term reviews for students who were on top of

their topic (Brenda). As one supervisor put it the PhD is something of a 'perseverance test' and students need to keep going when it looks black (Frank).

Another said some students 'whatever you do are never going to get it together' (Evelyn). When this happens a way out is to award a master's degree. This however is problematic for overseas students, particularly those funded by their home government (Oscar and David).

Such considerations bring up the question of how much help a supervisor can give. Most interviewed seemed to have developed their own individual and informal code of practice. Academic help was forthcoming as far as possible including some extreme but successful measures to help a student break through a writing block (Ian). But the line was drawn at writing for the student. The thesis had to be the student's.

Personal assistance varied. Some have students to their home, lend PCs, help with housing, visas and part-time jobs. Others clearly do not go this far. There was mention of the student support services available and reference to them seen as an appropriate way to handle major personal problems. Two of the supervisors came from established centres with significant numbers of overseas students (Penny and Neil). These centres had a more holistic approach to the personal, social and academic needs of the students, providing extensive support, assistance with writing skills, and social activities. One of these centres had in place a monitoring system for picking up difficulties rather than leaving it to student initiative.

The nature of assistance offered was seen to vary too according to the characteristics of the students. In some areas students arrive in an apparently 'adult' form. They are people with experience, some carrying already formed thesis topics or data sets, or have been in the field already (Brenda and Kim). They may be sponsored by their employers and cannot afford to fail. They are similar to or actually students who fit the professional model. They may have an instrumental approach which demands a certain degree of efficiency in the process. They are not looking to grow up personally. These students can appear in all discipline clusters as mature-aged students now enter the sciences.

The supervisors were asked to comment about any differences they saw in supervising men and women, and Australian and overseas students. As regards the former, those who commented reported either little experience with women students, some generalisations about the perceived characteristics of women students such as that they were less assertive or more competitive to compensate, or a few remarks about their own behaviour such as that they treat both sexes the same or as differently as in life in general. No-one showed any very explicit awareness of any gender issues, nor any awareness of there being issues to explore. One supervisor, who was female, could be said to sum up an attitude—the variation of supervisors and students is so complex that gender alone is not so important.

For overseas students, issues were identified. They were perceived as cultural—language and differing expectations. There were some contradictory contributions from supervisors with larger numbers of overseas students who noted significant differences among overseas students. It was suggested also that sometimes the English of an overseas student could be better than that of some Australians, and that they required less indulging because they were not sorting out life and growing up as were the Australians (Neil). In summary, it would seem that overseas students were perceived as a group with identifiable group needs, which did not appear to be the case for women students.

Rewards for Supervisors

The supervisors gave a range of responses to a question about what they gained from supervising PhD students.

- Students were seen to provide stimulation, keep their supervisor alive and up-to-date, giving feedback and sparking new ideas and research directions (seven academics commented).
- They provided the satisfaction of assisting someone develop—'turning potential into reality' (Albert, Jeff, Kim and Oscar).
- There was professional kudos to come from having good students, who became part of a widening intellectual network (Brenda, Frank and Neil).
- Students have an important role in the development of the knowledge base of the discipline or profession, without which it could not survive (Ian and Jeff).
- Students provided 'hands' to get work done and were seen to work harder than research assistants. Their involvement allowed more division of research tasks and in some cases more publications (seven academics commented).

Many of these responses catalogued intrinsic rewards. There was mention that it was part of 'the job' and EFTSUs (Evelyn and Frank), but even then the supervisors went on to talk of other benefits such as the stimulation. Another supervisor distinguished between the 'respectable' reason of pleasure in guiding a student, and the 'non-respectable' reason that:

if you are really moving fast along in research paths where nobody has been before, there's more than you can do yourself. And it's wonderful to bring other people in alongside you and that improves your career and helps in many ways, you're just cracking more nuts all the way along the line (Kim).

Another said 'You also get to be part of somebody's research at the time when they're perhaps at their most inventive and their most sort of intellectually aware' (Evelyn). And, according to yet another, you could always be surprised about how many new starts in one's own research related to supervision, coming out of the interaction. The analogy given

was that of reviewing books and theses—90 per cent drudgery in reading them and ‘then come across something’ (Brenda).

The question of authoring papers is currently a source of contention. From the interviews it is clear that different disciplines have different conventions, and that individuals have differing views within disciplines. The interpretation of student involvement in publications can vary also. It could be seen as a gain, in the sense that PhD students are ‘hands’ who enable an academic to achieve more. It could also be seen as a way of contributing more to the knowledge base of the discipline or profession. Co-authorship could be seen as part of the process of inducting a student into being a successful academic.

During the course of the PhD if the papers are produced I can guarantee I'm the one who does the writing which means that the broader view ... The student's name goes first because it's his paper I have only had one or two students who were good enough to actually write their own papers during that PhD work so that the actual paper production which ought probably to be part of a PhD course in many ways is missing in a lot of the students I've had. The production of the thesis in a PhD is a major thing. A paper in the way it is organised is very different to the way you organise a PhD thesis and I guess it is not until the work is completed almost that you can write the paper. At that stage the student is very much involved in producing his thesis and it is too much of a diversion so they tend not to get done (Carl).

You get co-authorship on some of the papers to which you've made an intellectual input. Different people have different ideas on this. Some supervisors think they should be on everything, I don't, that doesn't seem fair (Evelyn).

Two supervisors (Leon and Penny) thought you stood to gain more for your research, as you would get out more publications than you would if you were just working on your own. And you got more out of it than you would if you employed someone as a research assistant because the student is much more involved.

Overall what seemed evident from the responses is that for many the rewards of supervision are indeed a mixture of benefits to themselves as researchers and teachers, and to their disciplines or professions, and it is this that makes the experience satisfying personally and professionally. It was also clear that the rewards were greater where the students were deemed ‘good’ students who became part of the collegial network for the future and often friends. Where a student has a focus that generates intellectual excitement and gain, it leads ideally to a similar interest from the supervisor and a mutually stimulating relationship.

Student Selection

For the supervisors the issue in student selection is picking ‘winners’. When asked about patterns over time they all referred to students who proved to have the necessary talent as opposed to those who turned out to be less successful. Or as one interviewee put it:

I think that the most important feature of success is what they themselves bring to what they do. Good students will do well regardless of the circumstances and poor students will do badly almost regardless of circumstances (Albert).

An example of a very ‘good’ student was thus:

The student of mine who has just finished went through with minor corrections, it took him half an hour and the library copy was perfect. He was very organised, he not only had a fiancée in XX, he played professionally in a jazz band while he was here, he never missed a deadline, he never missed a mid-term report, he wrote up superbly but he was very well organised and he budgeted his time very effectively, and he was very bright so he had that lucky combination of being able to think well, he wrote easily and he just organised his life and I really think that that kind of organisation of trying to stick to deadlines is very helpful (Evelyn).

Although where there was clear recognition of other factors, student ability was still seen as important:

... well, I suppose it reflects on what sort of project they’ve been given probably and how they’ve been supervised indeed, the sort of support that going into the research school and there’s a component of luck I’m sure too—but I also see reflected very strongly, well as I say, their natural abilities at research which they might not know about till they themselves find out ... coupled with their education up to that time (Frank).

For this reason student selection is taken very seriously and done very thoroughly, with some groups vetting applicants as a collective endeavour. Considerations include academic record, written ability as demonstrated in materials, referees’ reports, relation of interests to individual or department research program, available facilities and supervision. However it is recognised as difficult because they are looking for more than an existing track record, which may not translate into success at the graduate level. The subtler qualities are harder to define and identify and are related in some cases to the style of the supervisor for research and supervision. For example one interviewee explicitly did not want a student with a predetermined project, but did want initiative because:

I like students with a lot of initiative. ... It’s just the way I operate I guess. ... Cause I often don’t know myself exactly what sort of a project we’re going into and how it’s going to end up (Leon).

The difficulties of prediction were clear and examples were given of the unexpected, one interestingly of a master's student who blossomed:

Oh, I think you know when you start off, which ones are going to be which. Because, you know, it's just basic intellectual capacity. I mean occasionally you will be wrong and they will astound you. But I haven't had that happen at PhD level. I've certainly had it below that level and I mean one of our best Masters students who I am hoping will come back for a PhD. When I worked with her in xxx she was very quiet, she did nothing, she was given opportunities, she didn't take them, her Director was unwilling to even nominate her to come to Australia and I said, give her a go, you never know. And when I got down here I was astounded, I didn't think it was the same person and since she's gone back, she's maintained the person that we knew down here. At that stage I gave up making predictions (Hillary).

Individual Interaction and Collaboration

Interviewees quite naturally spoke of themselves as the prime mover and source of support, direction and authority, but reference was made to other forms of support and criticisms made of traditional forms of supervision. Some of the interviewees raised such issues. One interviewee criticised traditional supervision for producing 'intellectual clones' (Neil). Some of the interviewees were in cross disciplinary areas where no one person could be expected to have all the necessary expertise which a student would want to draw on (Brenda). One interviewee went so far as to suggest that one person may never have all the expertise and human kindness etc. needed and that some distribution of these responsibilities could help (Evelyn).

However the supervisors interviewed had varied experience, feelings and views about supervisory panels. Ten of those interviewed had reservations about the panel system or were in favour of one supervisor having the main responsibility. The reasons for this ranged from one interviewee who stated frankly that he took a dominant role and drove out the other supervisors (Ian), to another who while saying panels could work well, worried that only one supervisor could mount a rescue operation (Kim). Another elaborated the difficulties, while being in favour overall:

Yes I've supervised collaboratively and it depends so much on the personalities involved and just who is taking responsibility for what. It's something that wants to be watched certainly although if a student really doesn't you know I think a student well, I would think it's very helpful for the student to have one person who really is primarily responsible he needs a sort of primary supervisor otherwise you know it's like having two masters so to speak I think it can be quite difficult and also I mean consciously or subconsciously there's a slight danger that the student will start playing the supervisors off against each other perhaps subconsciously (Frank).

Interestingly one interviewee acknowledged that it was difficult for students to receive conflicting advice, but suggested:

... in a sense, it might be agonising for the student at times, possibly. But, in a sense, its a, you know, its a good real life situation. You can send a paper off to a journal and get back two reviewers' reports and one says, this paper is ill-thought out, ill-executed and is fit for the rubbish bin, and the other one will say this person should be nominated for the Nobel prize ... since having supervisors disagree over main points does resemble that real life situation, in a sense it's a sort of, it can be valuable if unpleasant for a student because essentially it's the student's thesis, it's the student who takes responsibility, it's the student's work and they have to make up their own minds about which path they are going to take or whether they don't like either direction (Oscar).

Of those who favoured the panel system, the reasons were to do with broadening the advice and expertise available to the student, or more support:

Usually in a supervisory panel you get, in my experience anyway, somebody who is a particular expert in the field—in the actual if you like technical field that they're working in—but you also try and chose somebody who has perhaps a wider overview of the area and who also perhaps you can turn to if you're feeling in any difficulties and want to talk about more general things. You kind of act as sort of confessors to them when they have bust ups with their boyfriends or get thrown out of home or all this sort of thing. So you need to have a balance I think in a panel, so there is somebody you feel comfortable with in confiding in for say wider issues (Evelyn).

Other advantages were given for a panel system:

There's also a senior supervisor ... But we have co-supervision ... From the point of view of the student, it's broadening to work with more than one person and we really think that the traditional British PhD in quotes is much too narrow. That's the one without the coursework. So it's good for the student. Second, in terms of the academic resources we've got here, there are some faculty who are too junior to act as a sole supervisor and there are some pretty experienced faculty who understand how to use other junior faculty in an existing role and that's the way co-supervision comes about. And then thirdly, there are some very able students who listen to a course by some faculty member who isn't their supervisor, or listen to a seminar and then go and discuss it with them further. And a paper comes out of it and that's super too (Jeff).

Another advantage was seen as the ability to tap into expertise outside the University from groups like CSIRO (George).

Where the interviewees had programs in place in their centres in which panels were part of a more structured environment overall, the panel system was re-inforced by a philosophy which explicitly valued more collaborative approaches.

Institutional Support Mechanisms

The interviewees mentioned institutional mechanisms such as mid-term reviews, yearly reports, and guidelines which give advice such as on the clarification of expectations and possibly informal contracts. It would seem that they worked best where they fitted the culture and workflow of an area. For example in two areas the midterm review was something undertaken as a group activity in the school, that is, the supervisor did not determine whether or not a student continued and the reviews were seen as a major event (Carl). In another context there was a concern that it held up the process, with students marking time to comply (Frank).

There was some question as to the extent to which the review was used to discourage or prevent potential failures. The difficulty for those areas with mature students sponsored by governments or employers is much greater as there is more at stake and a MA is not always an acceptable outcome.

Departmental Initiatives

At the departmental level other more collegial mechanisms were in place to broaden the student experience. Mention of seminars varied, but some areas used them very deliberately as part of the supervisory process and had structured them accordingly. In one area there were a regular series of working seminars for PhD students to give them the opportunity to share ideas and develop them (Carl). In another area students were required to give an early seminar on their research proposal to ensure they were heading down a clear path (Albert). In another such seminars were seen as a chance to check up on how a student was going in a way in which day-to-day discussion did not achieve (Malcolm). For other areas these seminars were part of preparing students for their career whether in industry or a university.

The importance of seminars in many areas is a recognition of the need to expose students to a wider community of colleagues and ideas. These seminars were more than invitations to departmental seminars given by staff, though that happens also. In some cases they were part of programs which were structured in ways which went beyond the traditional relationship and were a deliberate move away from reliance on the one-to-one relationship by the provision of alternative and complementary structures. Such structures are an attempt to address some of the issues already raised which cannot be addressed while remaining constrained by the model of the one-to-one relationship. They are intended to strengthen the context and the overall process of supervision of which the basic relationship is then one component.

For example in four of the programs where staff were interviewed (Carl, Jeff, Neil and Penny), and at least in one other in the university, there are sufficient numbers of PhD students for a quite coherent support structure to be in place. This may include a Director for the PhD program, student advisers for overseas students, a system for checking the supervision, and editing assistance for thesis writing, rotation of students among staff to co-author papers and exposure to industry experience and group social activities. In these locations the students form an identifiable group which has its own advantage for informal peer support. In one instance they are located in one area to prevent the isolation attendant on separate offices.

In three instances the programs operate as systems which co-ordinate all aspects of graduate studies. They are quite deliberately organised to provide more collective assistance and in all three instances the interviewees (Jeff, Neil and Penny) saw themselves as avoiding the negative, as they saw it, aspects of highly individual arrangements which they had had some experience of in Australia.

Another feature of some areas who have a structured program for their students is the use of coursework in some form. In some cases this is part of a structured program of study from diploma, masters through PhD, which is then used to place students and assist those arriving without adequate preparation for advanced research in their discipline. It enables selection to be more inclusive without taking unacceptable risks. In one program the master's program includes a unit where students prepare a research essay which is their PhD proposal (Hillary).

Supervisor Professional Development

In the absence of any formal program for training supervisors it was interesting to discover where the supervisors gained their ideas on what to do. It seems that they tended either to react strongly against their own experience and do the opposite, or replicate what they saw as successful. Consider, for example, the following four comments:

Well certainly different. I did an external PhD in England and I saw my supervisor twice throughout my five year PhD, it was not a success. That was different, I did it externally at the University of Hull where I was working over the other side of the river and I just didn't see him at all. That was my university supervisor, I did have another supervisor who was much more helpful but no that was hopeless absolutely hopeless ... I was very lucky it was only that eventually my other supervisor who actually became a professor made me go and report because I was very bad at writing up made me go and report what I'd done and it became so embarrassing to say nothing it was less trouble to write it and I did it (Evelyn).

I had very informal supervision and I only had one supervisor which was possible then. Did I have an adviser? I can't even remember, I may have had just the one supervisor and that was fine. We got along very well. And we would talk about things. I think his style of supervision, in some respects is probably similar to my style now. But the reason for that is not that I'm emulating him but that just we saw things, we see things in a similar way (Oscar).

This is close to my heart because I had a visitor last week who did a PhD at the same time as I did ... and we're both now supervising students and the lab we went through is a highly respected lab but it had a very much single ... philosophy, where even at honours level PhD students and post operative staff and left very much own devices the good students got through ... really the student always had to make the running. In some ways that was fairly severe ... some that dropped out more than 50% left science. Those who went on to science had done pretty well generally. But what's interesting with this other person and I both had to have the opposite sort of approach to supervising students and I think in some ways, a gross over generalisation, but it's a bit like how generous parents have selfish children and then have generous children. You know what I mean that alternation. So you can have a reaction against your own experience. But also picked up some good points and one was that this person was always very accessible, very much an authority in the field and supported the student absolutely. One for example, at conferences ... or ... of staff members or whatever so the support was there but it really was up to the student to make use of it. Now I don't think it was all that good of a model but there was some positive aspects of it. ... the other persons opinion was that he probably oversupervised students ... to such an extent that they can't develop original ideas (George).

Well, I got my PhD in America and I worked with a supervisor who did all the things that I've been trying to enunciate. So I guess in the main I'm trying to do many of the things that my supervisor did. Now what did he do that was wrong: I didn't work with any other faculty member, that wasn't the situation where I went to university. And that's the only thing I imagine. When I was an undergraduate student which was at XXX in Australia I saw the way they handled graduate students because I was contemplating doing graduate work and I concluded that I did not want that sort of thing at all. This was the situation where the supervisor was a supervisor in name rather than fact. And told the student to go away and read this book and see if he could come up with an idea in six months. The supervisor was not publishing papers in the area and I just wished that such people could be canned by trade practices legislation. Because they've probably wrecked a lot of careers and that's pretty bad. Only deficit (in US) was that didn't work with any other faculty member—got that after PhD (did courses) in relation to research project (Jeff).

A Model of the Supervisory Process

None of this of course is completely new. What is interesting is to see the sixteen stories as variations on a theme about student progress and supervisory interaction. The variations are dependent primarily on context and the individual differences of the supervisors and the students. The context includes the nature of the research tasks and the methodology of the disciplines. The most obvious examples of this are where supervisors and students work with a large machine (telescope, accelerator) in ways that structure the research process and the relationships of the researchers, or the demands of fieldwork outside Australia. What is common is certain key features about how experienced supervisors seek to structure the supervisory relationship. Most important and central to this report is an identifiable pattern for the progress of a supervisory relationship through a student's PhD study. This pattern which is common across the disciplines represented has three stages. At the beginning significant effort and time is put into helping the student to find or establish a question, problem or topic for their thesis. Thereafter the student is monitored but interaction is less frequent, and often left to the student to initiate unless there are warning signals that the student is floundering or 'stuck'. The third stage is when it is time to stop 'doing' and to write up the thesis. In some cases this may be a matter of saying enough's enough. 'Writing up' the thesis is a major task even though other writing may and usually has been going on during the process in many areas. In other words the distribution of time and effort is 'bi-modal'.

The above analysis reveals a model of the supervisory process which is common to all disciplines. The following are the basic elements of that model:

- negotiating/guiding the move from dependence to independence which involves different degrees of direction at different stages—that is, it can become very directional in the final stage to force a student to complete, or if a student is floundering and losing confidence the supervisor may break the task down for them, and there is an effort to get them to write up their research to full advantage—so that the student move to independence is coupled with a bi-modal pattern of time allocation from the supervisor;
- varying the supervisory approach to suit the individual student's needs and personality, disciplinary differences and so on even though some interviewees expressed a preference for a particular approach and preferred students who suited that (in one such instance a supervisor preferred students who did not want timetables, lots of regular contact, etc; these students were identified as 'better' students);
- recognising that a key to the process is the formulation of the problem/topic/question because it is that which ensures focus and engagement. The tension comes from providing enough direction to stop students going down paths which are non-

productive (which is a problematic judgment in itself), without taking over. In other words the student has to 'own' their thesis. There was a suggestion that where a student completed a thesis but did not own it the supervisor would be disappointed with that as an outcome.

The central question which was addressed by the survey of supervisors and advisers which is reported in the next chapter was the general applicability of this model.

6. VARIATIONS IN SUPERVISOR PERSPECTIVES

Having examined the views of experienced supervisors on the elements of effective supervisory interactions and effective supervision, we now examine the variations of the views of supervisors on these issues. In particular, we consider in this chapter the perceptions of supervisors with respect to:

- the modes of supervision and advisement which are adopted by supervisors and advisers;
- the frequency and length of supervisory contacts;
- the most frequent way in which supervision contact is initiated;
- the academic relationship which obtains between supervisors/advisers and their students;
- the frequency of oral and written reports;
- the areas in which supervisors/advisers provide students with direction and/or assistance;
- the importance to students of wider academic contact; and
- the importance to students of university support services.

This chapter is based on the findings of a survey which was conducted in 1993 of all members of the ANU's academic staff engaged in the supervision of PhD students. As we have said, a central and novel feature of the questionnaire's approach which is taken into account in the following analysis was the concentration upon three periods of PhD courses: 'the first six months or so', 'the middle year or so' and 'the last six months or so'. This approach allows marked longitudinal differences in supervisory style to become apparent.

Details of the methodology employed in the questionnaire were given in the introduction. A copy of the questionnaire is contained in Appendix F. Appendix F also provides some basic demographics of the response population—in terms of the supervisors'/advisers' ages, genders, discipline clusters, teaching and research responsibilities, total official supervisory/advisory loads and graduate education backgrounds. These independent variables are taken into consideration in the analysis which follows. In all cases sufficiently many members of each category answered each question for the analysis which follows to be statistically sound.

Appendix H contains the tables upon which the comments in this chapter are drawn. These tables breakdown the responses to each question by the independent variables detailed above. The comments in this chapter are based on tests of statistical significance performed on the data in the tables.

The Modes of Supervision and Advision

Supervisory Interactions

Academics were asked to describe the relationships which they had with each of the students for whom they were currently an appointed supervisor by indicating the numbers of their current students for whom each of the following six statements best described their relationships with those students:

- a) 'I never have contact with this student.'
- b) 'In essence I am this student's only supervisor.'
- c) 'I see this student only at formal panel meetings.'
- d) 'I see this student when he/she needs my particular expertise.'
- e) 'I see this student regularly for general supervision.'
- f) 'Other.'

The categories are disjoint and, in particular, supervisors specified categories d) and e) only for students for whom they considered themselves not to be the student's only supervisor. Respondents were asked to identify how many of the students who they were currently supervising were in each category and identified 805 supervisory interactions in all.

As can be seen from Table H.1, it is rare (0.4 per cent) for academics to have no contact with students for whom they have been appointed as supervisors.

The traditional single supervisor model still operates to a considerable extent (23.4 per cent), although the vast majority of all supervisory panels do not operate on the single supervisor model. The single supervisor model is most common in the Pure, and particularly the Soft/Pure cluster and is least common in the Transitional cluster. Older academics, those over 55 years of age, appear to be less likely to be involved in single supervisor arrangements than younger academics, and female academics appear to be less likely to be involved in single supervisor arrangements than their male colleagues.

Academics who do not consider themselves to be the student's only supervisor tend to take an active interest in the student. Only 1.4 per cent of supervisory interactions are reported as occurring only at formal panel meetings. Also, supervisors who do not consider themselves to be the student's only supervisor tend to see their students regularly for

general supervision (57.1 per cent) rather than only when the student needs their particular expertise (16.5 per cent).

Considering the frequent supervisory interactions which are not on the sole supervisor model:

- Older academics, those over 55 years of age, are more likely than average to see their students only when their particular expertise is required rather than regularly for general supervision.
- Female academics are more likely than male academics to see their students regularly for general supervision rather than when their particular expertise is called upon.
- Academics whose graduate education was in North America are less likely than average to see their students regularly for general supervision and more likely than average to see their students only when their particular expertise is called upon.
- Academics without PhDs are less likely than their colleagues with PhDs to see their students regularly for general supervision and more likely to see their students only when their particular expertise is required.
- Academics with both teaching and research responsibilities are less likely than their colleagues with research only responsibilities to see their students regularly for general supervision and more likely to see their students only when their particular expertise is called upon.
- Academics in the Soft/Pure discipline cluster are much less likely than average to see their students regularly for general supervision and more likely than average to see their students only when their particular expertise is required. Academics in the Hard/Pure discipline cluster on the other hand are more likely than average to see their students regularly for general supervision and much less likely than average to see their students only when their particular expertise is required.

Advisory Interactions

Academics were also asked to describe the relationships which they had with each of the students for whom they were an appointed adviser in terms of five categories:

- a) 'I never have contact with this student.'
- b) 'I see this student only at formal panel meetings.'
- c) 'I see this student when he/she needs my particular expertise.'
- d) 'I see this student regularly.'
- e) 'Other.'

The categories are again disjoint. In each case the respondent was asked to identify how many of the students they were advising were in each category. In all the respondents identified 481 advisory interactions.

As can be seen from Table H.2, and in comparison with academics appointed as supervisors, academics appointed as advisers are more likely to never see the student (5.2 per cent compared to 0.4 per cent), more likely to see the student only at formal panel meetings (12.3 per cent compared to 1.4 per cent) and more likely to see the student when the student needs their particular expertise rather than regularly.

With respect to those advisers who never see their students:

- Advisers whose graduate education was not in Australia or the United Kingdom are more likely on average never to see students for whom they are an appointed adviser.
- Advisers with both teaching and research responsibilities are more likely than their colleagues with only research responsibilities never to see students for whom they are an appointed adviser.
- Advisers from the Soft/Pure Discipline cluster are more likely than their colleagues from the other discipline clusters never to see students for whom they are an appointed adviser.

With respect to those advisers who only see their students at formal panel meetings:

- Male advisers are much more likely than female advisers to see the students for whom they are an appointed adviser only at formal panel meetings.
- Advisers whose graduate education was undertaken in the United Kingdom are more likely than their colleagues to see the students for whom they are an appointed adviser only at formal panel meetings.
- Advisers who do not themselves have PhDs are much more likely than their colleagues who do have PhDs to see the students for whom they are an appointed adviser only at formal panel meetings.
- Advisers from the Applied discipline clusters are less likely than their colleagues to see students for whom they are an appointed adviser only at formal panel meetings.

With respect to the question of whether students (who are seen more regularly than at formal panel meetings) are seen regularly or only when their particular expertise is required:

- Older advisers, those over 55 years, of age are more likely than their younger colleagues to see the students for whom they are appointed advisers only when their particular expertise is required rather than regularly

- Female advisers are more likely than their male colleagues to see the students for whom they are appointed advisers only when their particular expertise is required rather than regularly
- Advisers whose graduate education was in North America are less likely than their colleagues to see the students for whom they are appointed advisers regularly rather than only when their particular expertise is required.
- Advisers who have both teaching and research responsibilities are more likely than their colleagues to see the students for whom they are appointed advisers only when their particular expertise is required rather than regularly.
- As the supervisory/advisory load of the academic increases, the academic is less likely to see students for whom they are an appointed adviser regularly and more likely to see students for whom they are an appointed adviser only at formal panel meetings.

Significant Other Supervision

Academics were asked to indicate if they provided significant supervision to students for whom they were not an appointed supervisor or adviser. As can be seen from Table H.3 the majority (50.8 per cent) of supervisors/advisers report that they provide additional supervision to students for whom they are neither an appointed supervisor nor adviser.

Furthermore:

- Academics without PhDs are much less likely than their colleagues with PhDs to provide additional supervisory assistance.
- Academics with greater official workloads are much less likely to provide additional non-official supervision to other students. Academics with lighter official workloads are much more likely to provide additional non-official supervision to other students and academics.
- Academics with both teaching and research responsibilities are less likely than their colleagues with research only responsibilities to provide additional supervisory assistance.
- Academics from the Soft discipline clusters are less likely than their colleagues to provide additional supervisory assistance. Academics from the Transitional discipline cluster are more likely than their colleagues to provide additional supervisory assistance.

The Frequency and Length of Supervisory Contacts

Frequency of supervision contacts

Respondents were asked about the frequency with which they saw students specifically for supervision during three periods of students' candidatures: the first six months or so, the middle year or so, and the last six months or so. The responses of supervisors were on the five point scale: Every Day, Weekly, Fortnightly, Monthly and Less Often.

As can be seen from Tables H.4, H.5 and H.6 there is a general bimodal pattern of supervisory interaction. Supervisors tend to see their students more frequently in the first and last six months of the student's PhD and less frequently in the middle period. However, significant numbers of students receive few supervisory consultations even in the last six months or so of their PhD.

The most significant differences in the frequency of supervisory contact appear to obtain between discipline clusters. In particular:

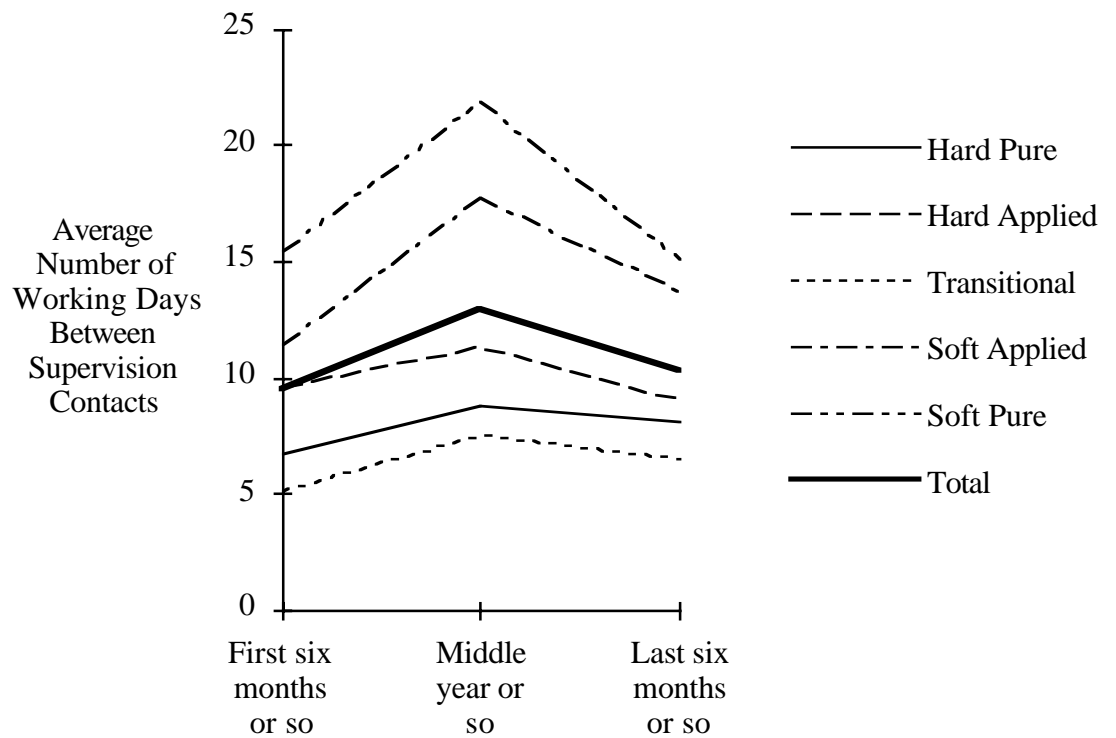
- Everyday consultations are more frequent in the Transitional discipline cluster and in the Hard/Pure discipline cluster throughout the course of students' PhDs.
- Consultations less frequently than fortnightly are very common in the Soft/Pure and Soft/Applied discipline clusters, especially during the middle period of the PhD.
- The Hard/Applied discipline cluster also tends away from Everyday consultations.

Other significant differences occur with respect to:

- The academic responsibilities of supervisors/advisers: academics with research only responsibilities rather than teaching and research responsibilities are much more likely to see students more frequently throughout the PhD.
- The total official supervisory/advisory load of the academic: academics with more than 5 students are more likely to see those students less frequently than other academics throughout the PhD.

Figure 6.1, below, was obtained by converting the ordinal data on the frequency of supervisory contact provided by the supervisors to interval data representing the approximate number of working days between supervisory contacts. Supervisory contacts which occurred less frequently than monthly were assumed to occur every 40 working days. The chart graphically

Figure 6.1: Average Number of Days between Supervisory Contacts



displays the bimodal pattern of supervisory input which is common across the discipline clusters. In general, students appear to receive more frequent supervision in the first and last six months of their PhDs than they do in the middle year of their PhD. The chart also displays the variation in this underlying bimodal pattern which occurs across the discipline clusters.

Table 6.2 below crosstabulates the frequency of supervisory contact in the middle year of the PhD with the frequency of supervisory contact in the first six months or so of the PhD and with the frequency of supervisory contact in the last six months or so of the PhD. In the transition from the first six months or so of the PhD to the middle year of the PhD, the tendency is to less frequent consultations: 33.3 per cent of supervisors who saw their students everyday now see them only weekly or fortnightly and 27.3 per cent of supervisors who saw their students at least fortnightly now see their students less often.

Table 6.2: Crosstabulation of Frequencies of Supervisory Contact

Frequency in the Middle year or so:	Every Day	Weekly-Fortnightly	Less Often
Frequency in the first six months or so			
Every Day	66.7	33.3	0.0
Weekly-Fortnightly	0.0	72.7	27.3
Less Often	0.0	7.0	93.0
Frequency in the last six months or so			
Every Day	70.3	27.0	2.7
Weekly-Fortnightly	3.0	73.4	23.7
Less Often	0.0	8.5	91.5

In the transition from the middle year of the PhD to the last six months of so of the PhD this trend is reversed. 29.7 per cent of supervisors who see their students every day in the last six months of the PhD saw their students less frequently in the previous year, and 23.7 per cent of supervisors who see their students at least fortnightly in the last six months or so of the PhD saw them less frequently in the previous year.

Despite the evidence of the Figure 6.1 and of Table 6.2 there is a major trend, however, for the frequency of supervisory contact to remain constant through the PhD. 93.0 per cent of supervisors who see their students less frequently than fortnightly in the first six months or so of the PhD continue to see their student less frequently than fortnightly in the middle year of the PhD and of those supervisors who see their students less frequently than fortnightly in the middle year of the PhD 56.8 per cent continue to see their students less frequently than fortnightly in the last six months or so of the PhD.

Similarly 72.7 per cent of those supervisors who see their students at least once a fortnight (but not everyday) in the first six months or so of the PhD continue to see their students at this frequency in the middle year of the PhD and of those supervisors who see their students at least fortnightly (but not everyday) in the middle year 89.2 per cent continue to see their students with this frequency in the last six months or so of the PhD.

Of those supervisors who see their students every day in the first six months or so of the PhD, 66.7 per cent continue to see their students with this frequency in the middle year of the PhD and of those supervisors who see their students every day in the middle year of the PhD, 83.9 per cent continue to see them with this frequency in the final six months or so of the PhD.

This pattern is common across the discipline clusters and can also be seen in the correlation coefficients which obtain between the variables which measure respectively the frequency of supervisory contact in the first six months or so, the middle year and the last six months or so of the PhD where these variables are taken to represent interval data. The correlation coefficients are respectively:

- 0.83 (correlation between the first six months or so and the middle year of the PhD);
- 0.78 (correlation between the middle year and the last six months or so of the PhD);
- 0.73 (correlation between the first and last six months or so of the PhD).

Average Duration of Supervision Contacts

Respondents were asked about the average duration of the sessions in which they saw students specifically for supervision in three periods of students' candidatures: the first six months or so, the middle year or so, and the last six months or so. The responses of supervisors were on the four point scale: Less than 15 minutes, Between 15 and 30 minutes, Between 30 and 60 minutes and More than an hour.

As can be seen from Tables H.7, H.8 and H.9 significant differences in the average duration of supervisory contact appear to obtain between discipline clusters. In particular:

- Short consultations (< 30 minutes) are more frequent in the Transitional discipline cluster, and to a lesser extent the Hard/Pure discipline cluster, throughout the course of students' PhDs.
- Consultations longer than 30 minutes are very common in the Soft/Pure and Soft/Applied discipline clusters.
- Long consultations (that is, more than 30 minutes) are also the norm in the Hard/Pure and Hard/Applied discipline cluster.
- In all discipline clusters except the Hard/Pure discipline cluster there is a tendency towards long consultations in the last six months or so of the PhD.

Two other variables which appear to influence the average duration of consultations are the total official supervisory/advisory load of the academic and the academic's teaching and research responsibilities. In the latter case it appears that academics with only research responsibilities see students on average for shorter consultations.

Table 6.3 below crosstabulates the average duration of supervisory contact in the middle year of the PhD with the average duration of supervisory contact in the first six months or so of the PhD and with the average duration of supervisory contact in the last six months or so of the PhD.

Table 6.3: Crosstabulation of Duration of Supervisory Contacts

Minutes	< 15	16-30	31-60	> 60
Duration in the first six months or so				
< 15 minutes	87.5	6.3	0.0	6.3
16-30 minutes	10.9	73.9	15.2	0.0
31-60 minutes	0.0	18.5	73.1	17.0
> 60 minutes	0.0	1.7	25.4	72.9
Duration in the last six months or so				
< 15 minutes	84.2	15.8	0.0	0.0
16-30 minutes	6.1	81.8	12.1	0.0
31-60 minutes	3.7	21.5	68.2	6.5
> 60 minutes	0.0	5.6	31.9	62.5

In the transitions from the first six months or so of the PhD to the middle year of the PhD, and from the middle year of the PhD to the last six months or so of the PhD there is no clear tendency to longer or shorter consultations. There is, indeed, a major trend for the duration of supervisory contact to remain constant through the PhD. 87.5 per cent of supervisors who see their students for short supervision session (less than 15 minutes) in the first six months or so of the PhD continue to see their student for short supervision sessions in the middle year of the PhD and of those supervisors who see their students for short supervision sessions in the middle year of the PhD 66.7 per cent continue to see their students for short supervision sessions in the last six months or so of the PhD. Similarly 72.9 per cent of those supervisors who see their students for long supervision sessions (more than an hour) in the first six months or so of the PhD continue to see their students for long supervision sessions in the middle year of the PhD and of those supervisors who see their students for long supervision sessions in the middle year 86.5 per cent continue to see their students for long supervision sessions in the last six months or so of the PhD.

This pattern is common across the discipline clusters and can also be seen in the correlation coefficients which obtain between the variables which measure respectively the average duration of supervisory contact in the first six months or so, the middle year and the last six

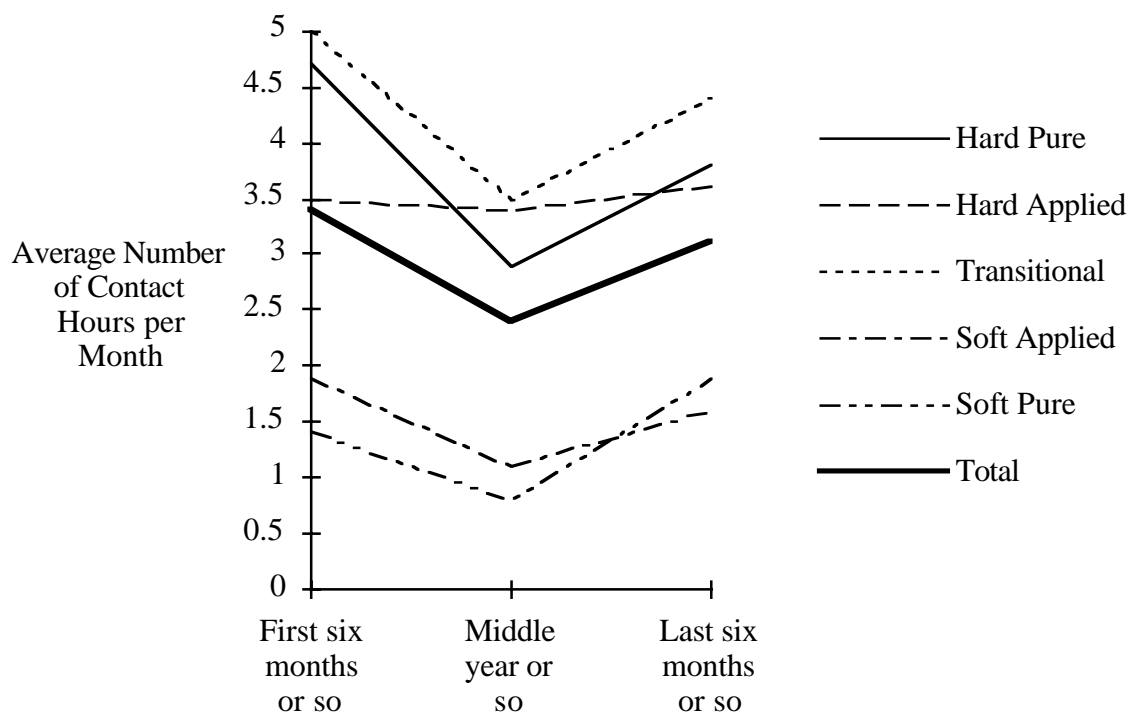
months or so of the PhD where these variables are taken to represent interval data. The correlation coefficients are respectively:

- 0.81 (correlation between the first six months or so and the middle year of the PhD)
- 0.78 (correlation between the middle year and the last six months or so of the PhD)
- 0.69 (correlation between the first and last six months or so of the PhD).

Total Time Spent with Student per month

An estimate of the total time spent in supervision of a student by a supervisor can be derived from the frequency and average duration of consultations. These estimates for the three periods the first six months or so, the middle year or so, and the last six months or so are crosstabulated for the total response population and by the age, gender, graduate education background, teaching and research responsibilities, total official supervisory/advisory load and discipline cluster of the respondents in Table H.10.

Figure 6.4: Extent of Supervisory Contact (in hours per month)



Several features are immediately obvious from the Table and from Figure 6.4. In particular:

- The pattern of time spent with students is essentially bimodal, with the interesting exception of the Hard/Applied discipline cluster where supervision contact appears to be constant throughout the PhD.
- The bimodality comes in different forms however. In the Hard/Pure, Transitional and Soft/Applied discipline clusters more time is spent with the student in the first six months than in the last six months. This pattern is reversed in the Soft/Pure discipline cluster.
- Female academics similarly tend to spend more time with students towards the end of the student's PhD than at the beginning.
- Significantly less time is spent with each student by academics in the Soft discipline clusters throughout the student's PhD.
- Academics with both teaching and research responsibilities spend on average less time than their colleagues with only research responsibilities with each student at all stages of the student's PhD.

Correlation between Frequency of Contact and Average Duration of Contact

Not surprisingly there is a strong correlation between the length of supervisory contacts and the frequency with which supervision contacts occur. In the first six months or so of students PhDs, for example, 67.4 per cent of consultations which occur everyday are for less than 30 minutes while 69.7 per cent of consultations which occur less often than fortnightly are for more than 30 minutes. Similarly in the middle year or so of students' PhDs 70.9 per cent of consultations which occur everyday are for less than 30 minutes while 72.2 per cent of consultations which occur less often than fortnightly are for more than 30 minutes, and in the last six months or so of students PhDs 62.9 per cent of consultations which occur everyday are for less than 30 minutes while 69.5 per cent of consultations which occur less often than fortnightly are for more than 30 minutes.

Initiation of Meetings

Academics were asked to indicate for each of the three periods of students' PhDs (the first six months or so, the middle year or so and the last six months or so) which of six possible modes of initiation were commonly used for their supervisory meetings with students. Respondents were permitted to indicate more than one mode of initiation if they so desired. The six possible modes were:

- initiation by the student;
- initiation by the academic;
- initiation according to an agreed schedule;
- initiation by chance;

- initiation by circumstances (for example, joint presence in a lab); and
- initiation by other means.

Although academics reported that they did meet students by chance (for example, in the corridor or at morning tea) their responses indicate that in general they do not regard the meetings so initiated as supervisory interactions. In each of the three time periods considered less than 3 per cent of respondents indicated that they commonly engaged in supervisory interactions which had been initiated by chance. Only 1 respondent used the “other” category. Because of their low frequency, these two modes of initiation are ignored in the remainder of this section.

The responses for these three periods are crosstabulated for the total response population and by the age, gender, graduate education background, teaching and research responsibilities, total official supervisory/advisory load and discipline cluster of the respondents in Tables H.11, H.12 and H.13 respectively.

Interestingly, as can be seen from the tables, students tend to be less commonly the initiators of supervisory interactions as the PhD progresses and correspondingly academics tend to be more commonly the initiator as the PhD progresses. The use of schedules as the initiator of meetings remains reasonably constant throughout the PhD although it does tend to become less common in the last six months or so. Similarly, in those disciplines in which circumstances commonly initiate supervisory interactions this mode of initiation becomes more frequent in the middle of the PhD and less frequent in the last six months.

As may have been expected circumstances are a common initiator of supervisory interactions in the Hard and Transitional discipline clusters reflecting the lab and equipment based nature of these discipline clusters and extremely rare in the Soft discipline clusters.

In the Hard/Applied disciplines (in which at the ANU, there are a large number of overseas students and a number of graduate programs designed to cater for their needs) student initiative is the least common mode of supervisory interaction initiation and initiation according to an agreed schedule is more common than in other disciplines. In these disciplines academics do not take a higher than average role in initiating supervisory interactions. The transferral of responsibility for supervisory interaction is not, that is, from the student to the academic but from the student to the structure of an agreed schedule.

In the Transitional discipline cluster, where there are a relatively large number of external supervisors and “external” students, a heavy reliance is placed upon student initiation in the first six months and to a lesser extent throughout the PhD. The Transitional discipline cluster also has a relatively high emphasis upon initiation by circumstances throughout the PhD.

Academic Relationship

Academics were asked to indicate for each of the three periods of students' PhDs (the first six months or so, the middle year or so and the last six months or so) which of six possible academic relationships commonly formed between them and their students. Responses have been coded so as to allow for more than one mode of relationship. The six possible academic relationships were:

- Teacher/Student;
- Joint Researchers;
- Senior/Junior Academics;
- Departmental Colleagues;
- Employer/Employee; and
- Other.

Although academics reported that they did occasionally form Employer/Employee or Other relations with students these were very rare. Less than 3 per cent of respondents indicated that they formed Employer/Employee or other relations with students. Because of their low frequency, these two modes of relation are ignored in the remainder of this section.

The responses for these three periods are crosstabulated for the total response population and by the age, gender, graduate education background, teaching and research responsibilities, total official supervisory/advisory load and discipline cluster of the respondents in Tables H.14, H.15 and H.16 respectively.

In all disciplines the temporal trend is away from that of Teacher/Student and towards either that of Joint Researcher, Senior/Junior Academic or Departmental Colleague. Moreover, the most significant changes in relation occur in the move from the first six months to the middle year or so. Significant differences in the trend occur with respect to several of the independent variables however:

- Female supervisors/advisers are more likely to form Departmental Colleague relations while male supervisors/advisers are more likely to form Joint Research relations with their students.
- Younger supervisors/advisers (those under 36 years) are less likely than their colleagues to form Teacher/Student relations with their students in the beginning and more likely than their colleagues to form Senior/Junior Academic relations with their students.
- Supervisors/advisers whose graduate education was not undertaken in Australia are more likely to form Teacher/Student relations with their students.

- Supervisors/Advisers with both teaching and research responsibilities are more likely than their colleagues with research only responsibilities to form Teacher/Student relations with their students.
- As the supervisory/advisory load of an academic increases so does the likelihood that the academic will form Teacher/Student relations with their students.
- Academics in the Soft disciplines are less likely than those in the Transitional and Hard disciplines to form Joint Researcher relations. They are more likely to end up as Departmental Colleagues. Academics in the Soft/Applied disciplines are more likely to start out as Departmental Colleagues.
- Transitional and Hard discipline academics are more likely than other academics to be Joint researchers at all stages. They are less likely to form the relation of Departmental Colleague. Those in the Hard/Pure disciplines are less likely however than those in the Transitional or Hard/Applied disciplines to be Joint Researchers at the beginning.

Formal reports

Academics were asked to indicate how often they required their students to make formal reports (written and oral) to them. The responses are tabulated in Tables H.17 and H.18 respectively.

With respect to written formal reports the majority of supervisors require such reports from their student at least yearly. Several differences with respect to the independent variables also appear evident:

- Female academics appear to require written formal reports with greater frequency than their male colleagues.
- Academics with PhDs similarly appear to require written formal reports with greater frequency than their colleagues without PhDs.
- Written formal reports also appear to be more important to academics with greater numbers of students.
- With respect to disciplinary differences, academics from the Soft/Pure and Soft/Applied discipline clusters are more likely to require formal written reports at half yearly or greater frequency. Academics from the Transitional discipline cluster are significantly more likely to require some formal written report at some stage.

With respect to oral formal reports, these clearly occur with more frequency than formal written reports. With respect to the independent variables it appears that:

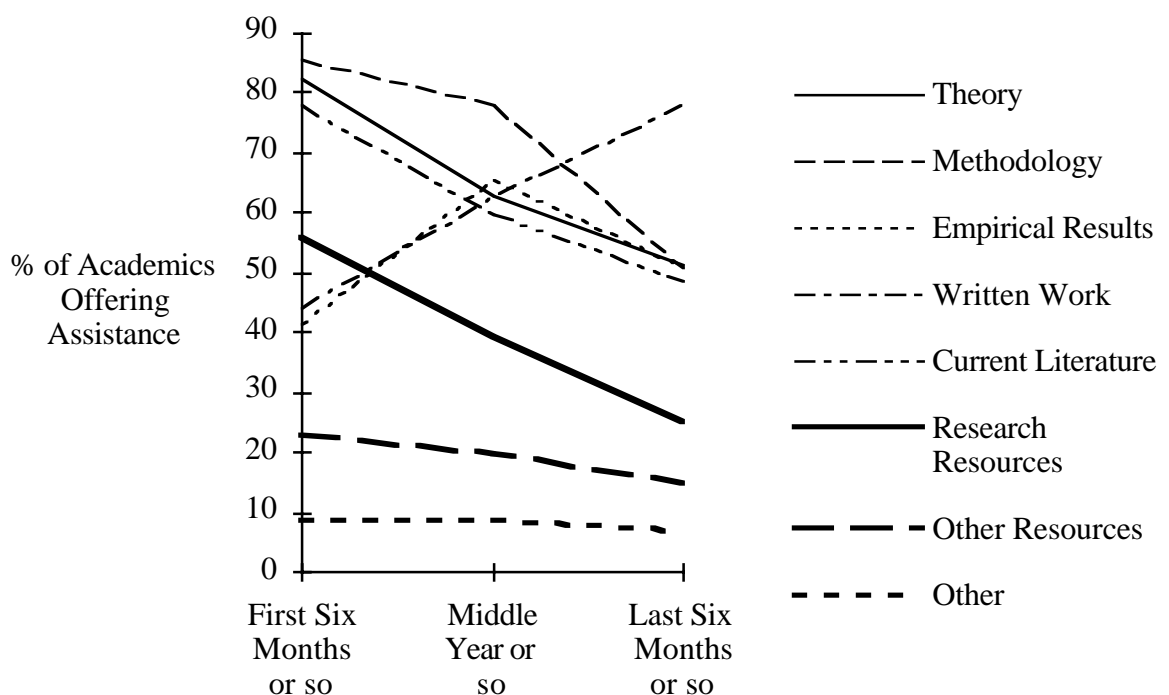
- Academics with larger numbers of students place more reliance upon frequent formal oral reports.
- Academics with both teaching and research responsibilities appear to place more emphasis upon frequent formal oral reports than their colleagues with research only responsibilities.
- Academics from the Soft/Pure discipline cluster are significantly more likely to require formal oral reports more frequently than half yearly and academics from the Transitional discipline cluster are significantly more likely to require some formal oral report at some stage.

Areas of Assistance offered by Academics

Academics were asked to indicate in which of the following eight areas they provided assistance to students during the three periods of interest to the study: theory, methodology, empirical results, written work, current literature, research resources, other resources and other.

The responses are tabulated in Tables H.19, H.20 and H.21 respectively. Overall trends with respect to the eight categories of assistance are shown in Figure 6.5 following.

Figure 6.5: Overall Trends in Areas of Assistance Offered by Academics



Theory

As the PhD progresses the degree of assistance offered by academics with respect to theory clearly diminishes, although it remains significant throughout the PhD. We note that:

- Male academics tend to offer more assistance with respect to theory than female academics.
- Academics with both teaching and research responsibilities offer significantly less help with theory than their colleagues with research only responsibilities.
- Academics with more students tend to offer more assistance with theory than their colleagues with fewer students.
- Unlike the other four discipline clusters the trend in the Hard/Pure discipline cluster is for the amount of assistance with theory to increase in the middle year or so rather than to monotonically decrease as the PhD progresses.
- Academics in the Soft/Pure discipline cluster offer significantly less assistance with theory, especially in the first six months or so and the middle year or so.

Methodology

With respect to assistance with methodology, the trend again is for the level of assistance to decrease as the PhD progresses. This is especially true in the last six months or so. Again although the level of assistance is decreasing significant assistance is still provided throughout the PhD. With respect to the independent variables we note that:

- Academics who obtained their PhDs in Australia offer less assistance with respect to methodology than their colleagues.
- Academics with greater numbers of students tend to offer more assistance with respect to methodology.
- Academics from the Soft/Pure discipline cluster offer less assistance with respect to methodology through the period of the PhD.
- Academics from the Transitional discipline cluster offer significantly more assistance with respect to methodology in the middle year or so than their colleagues.
- Academics from the Soft/Applied discipline cluster cease offering assistance with methodology more quickly than their colleagues. (This may reflect the structured nature of many of the Soft/Applied programs in which methodological issues are often dealt within Masters and Graduate Diploma courses.)

Empirical Results

Overall the level of assistance with empirical results provided by academics tends to increase in the middle year or so of the PhD. With respect to the independent variables:

- Academics with both teaching and research responsibilities tend to offer less assistance with respect to empirical results than their colleagues.
- Academics with more students tend to offer more assistance with respect to empirical results.
- Academics from the Transitional discipline cluster offer significantly more assistance with empirical results than their colleagues.

Written Work

With respect to assistance with written work, the level of assistance offered in this area tends to increase as the PhD progresses. With respect to the independent variables:

- Younger academics offer less assistance with written work towards the end of the PhD.
- Academics who obtained their PhDs in Australia offer less assistance with written work at the beginning of the PhD.
- Academics without PhDs offer more assistance with written work towards the end of the PhD,
- Academics with more students tend to offer more assistance with written work throughout the PhD.

Current Literature

With respect to assistance with the current literature, the overall trend is for such assistance to decrease as the PhD proceeds. With respect to the independent variables:

- Academics with more students tend to offer more assistance with respect to the current literature.
- Academics from the Hard/Applied and Soft/Pure discipline clusters tend to offer less assistance with the current literature than their colleagues.

Research Resources

The overall trend with respect to assistance with research resources is for the amount of assistance to decrease throughout the PhD. With respect to the independent variables:

- Academics with both teaching and research responsibilities are less likely to offer assistance with research resources than their colleagues.
- Academics with more students are more likely to offer assistance with research resources.
- Academics from the Transitional discipline cluster are more likely than their colleagues to offer assistance with research resources while academics from the Soft/Pure discipline cluster are less likely than their colleagues to offer assistance with research resources.

Non-Research Resources

With respect to non-research resources, the level of assistance remains relatively constant throughout the PhD. The only significant independent variable effect is that academics with more students tend to offer more assistance.

Other Assistance

With respect to other assistance which is non-academic, the level of assistance again tends to be constant. However:

- Women academics are much more likely to offer other assistance to their students.
- Academics with both teaching and research responsibilities are also more likely to offer other assistance to their students.
- Academics with more students are more likely to offer other assistance to their students.

Use of Other Resource People

Respondents were asked to indicate whether they had and whether they would, if the need arose, make use of the following resource people (the responses are tabulated in Tables H.22 and H.23 respectively) :

- Graduate Program Convenor;
- Department Head;
- Faculty Dean/School Head;
- Graduate Student Section;
- Study Skills Centre;
- Counselling Centre.

Considering the responses with respect to the possible use (if the situation arose) of these resource people we note that:

- Female academics are more likely than their male colleagues to refer students to all of the six resource people mentioned.
- Academics with both teaching and research responsibilities are more likely than their colleagues to refer students to all of the six resource people mentioned.
- Academics with more students are more likely to refer their students to each of the six resource people mentioned.
- Academics from the Soft/Applied discipline cluster are more likely than their colleagues to refer their students to each of the six resource people mentioned.

Importance of Other Activities

Respondents were asked to indicate how important they considered it to be for their student to participate in the following activities:

- Informal Seminars/Reading Groups;
- Local Formal Seminars;
- Other Formal Seminars;
- Graduate Program Student Seminars;
- Graduate Program Staff Seminars;
- Seminars run by Other Graduate Programs;
- Australian Conferences;
- Overseas Conferences.

The responses are tabulated in Table H.24.

Overall, although a high degree of participation is encouraged, it is clear that activities closer to home are considered more important. The only significant differences with respect to the independent variables are that academics with greater supervisory loads and academics from the Soft and Transitional discipline clusters are both more likely than their colleagues to encourage their students to attend seminars outside their departments.

In Summary

The questionnaire sent to supervisors is based on 306 respondents and provides important data on supervisory styles and interactions perceived by them. On the whole, it appears that the supervisory panels now dominate the interactions between PhD students and academic staff. Less than one-fourth of the supervisors reported that they operated in effect on a single supervisor model. Furthermore, the variations with respect to supervisory panel arrangements were systematic, which suggests that the multi supervisor format may be more functional and that future supervisors might efficaciously be trained to work in panel settings.

Another pattern which is clear concerns the frequency of interaction between supervisors and their students. Although there are differences in frequency of interaction, in particular that females see their students more than males, and research only supervisors see their students more than teaching and research supervisors, the dominant pattern is that virtually all supervisors report seeing their students more frequently at the beginning and at the end of the students' PhD career (the only exception being academics from the Hard/Applied discipline cluster). This suggests a life cycle in PhD supervision which seems fairly

predictable, and one in which the PhD student is gradually assimilated into a collegial or collaborative culture with the supervisor and other members of the academic staff. These patterns clearly indicate the processes of professional socialisation at work whereby the student experiences the transition from a student role to that of a professional. This transition is further indicated by the diminishing trends in areas of assistance offered by supervisors (see Figure 6.5) where the only form of assistance which increases throughout the PhD career is with written work which is in effect, as indicated in chapter 5, a separate supervisory task.

From the four chapters which form the ethnography of the PhD presented in this Part we can see that the central character of the PhD revealed by our studies is one of patterns with variations which, in most cases, can be understood and explained. These patterns confirm that academics and students do not go about their business according to strict guidelines, but often adjust the process to suit their own personalities and contexts. It is important to recognise this fact. Within the context of this study it is also clear that the majority of supervisory relationships are seen to be satisfactory by the students. Although from the students' own diaries one might be tempted to conclude that supervisors are minor actors in the PhD career, this is not necessarily the case. Effective supervision can make a difference, and it is in this context that the notion of a supervisory panel seems to have been successful. The panel can provide both students and supervisors with alternatives, with ways of overcoming difficulties which a single supervisor may not be able to address. These points will be taken up in Part III which seeks to more systematically draw conclusions from Parts I and II.

Much of the literature on graduate education and supervision has concerned itself with the effects of age, gender, and national and linguistic backgrounds on the experience of the PhD for students. The results in Chapter 4 confirm that these variables do have some effect. The results of Chapter 6, however, indicate that the demographics of the supervisor population - age, gender, graduate education background and teaching responsibilities - also, and perhaps even to a greater extent, affect how they conduct supervision. The effects of the supervisor population have previously been underanalysed due to the concentration upon the apparently more obvious differences among the student population.

PART III

RESTRUCTURING FOR THE ACHIEVEMENT OF QUALITY IN SUPERVISION

7 DISCUSSION AND CONCLUSIONS

The Student Passage

The picture that emerges from our studies of students is that of self organising learners and researchers of varying effectiveness. The students are learning how to do research and learning through their research. Many are learning new techniques and skills. They are learning the cultural norms and rituals of their discipline and of the academic profession. They are learning about managing resources including their own time. Assistance is gathered from a variety of sources. This picture emerged from the student diaries, and was confirmed in the questionnaire survey, where it was established that students seek assistance from a range of persons in addition to their designated supervisors and advisers. Other academics, other students and technical staff are involved as the tasks demand or to broaden thinking. Interestingly 86.7 per cent of the students also gave informal seminars and reading groups as important and 98.0 per cent of the students gave formal seminars as important. There were few recluses in this study.

The studies confirmed as important across discipline boundaries the experience itself as a passage that has to be completed. It is a passage during which students are learning many things at different levels simultaneously. It is not only the complexity of this which can be daunting but also the recognition that the levels, and the interplay of the levels, involve further intellectual and emotional challenges. The intensity of the challenges varies for individual students.

There are various ways in which the passage can be construed, but there is value in adopting, and cashing out, the metaphor of the rite of passage which is one of the most common metaphors used by academics and students to describe the process of PhD education—it is an intrinsic part of the apprenticeship metaphor.

The period of PhD candidature and the PhD student have many of the characteristics of the liminal period and the neophyte. During a rite of passage, neophytes are first separated from their earlier fixed point in the social structure and then, having passed through the intervening liminal period, they are in a stable state once more and, by virtue of this, have rights and obligations of a clearly defined and structural type, and are expected to behave in

accordance with certain customary norms and ethical standards. As an undergraduate, the student—like the child—has a fixed place within the social structure of the university. A rite of passage is required to remove students from this place. Before the student enters the PhD they are closely identified with the body of knowledge presented to them by their discipline which they have been reproducing and analysing. They are now expected to move from reproduction and analysis to speculation—the essence of originality.

The value of using this metaphor is to suggest the importance of the experience as a transforming process of which carrying out research tasks and writing a thesis is a part. A similar perspective on the personal comes from Reason and Marshall (1987) who have looked at research as personal process. They see research as personal process from a number of perspectives, the existential, the psychodynamic and the transpersonal perspective where the enquiry process is part of the discovery and realisation of the self. They suggest that rather than focussing only on the content of the research, the need is to pay attention to the student's intellectual and emotional process. The emphasis must include the 'how' of enquiry, not just the 'what' or 'why'. However they caution that it is important to know the limits of what can appropriately be worked through within the research context, and what may need addressing in a more overtly psychotherapeutic relationship.

A more prosaic description of such processes is given by Phillips (1984) who sees the process of research as one of stages: 'enthusiasm, interest in work, transfer of dependence from supervisor to work, frustration, boredom, determination to finish what they have started'. She sees raising students' awareness of this as a useful way of helping them. They cannot stop the process but they will be able to recognise what is happening.

The conception of the student as a self organising learner opens up possibilities for a variety of support structures. Alerting students to the nature of the passage is one way to assist in dealing with the emotional dimension. Other assistance can include skills for learning and researching. For when learners become more aware of their own learning processes through making them more explicit and reflecting on them, they can gain greater control of them. Learning how to learn has become of more interest as studies of student cognition at the undergraduate level conceive of learners as active agents, and is considered important in adult education where self-directed learning is valued as a strategy and a goal (Biggs, 1989; Cross and Angelo, 1988). Assistance in specific skills such as those for writing can be offered by specialists other than the supervisor as is the case at the ANU where there is a graduate study skills adviser.

Equally important for individual students is to clarify the purpose of the passage for themselves. There is considerable agreement about the criteria for a successful thesis and

therefore what is to be demonstrated as learned as a researcher. Students are expected to show:

- originality of data or analysis of the data;
- coherence of argument and presentation;

- competence in analysis, technical and conceptual; and
- contextual competence.

But from both the student studies and the supervisor interviews it is clear that there is a variety of ways of looking at the purpose and outcomes of the PhD itself. This is because it is a complex process as already discussed and because, as argued by Cullen and Allen (1993) and supported by the experienced supervisors, expectations and outcomes vary. No longer is the PhD necessarily entry into the academic profession. Nor is it always entry into any profession. In some cases and in some disciplines gaining a PhD happens late in an already successful career. In others it is used to change direction.

Recognition of varying outcomes raises questions about socialisation. The postdoctoral fellows were most articulate about this aspect. Their list of what is learned about being an academic echoes other discussions on the topic by writers such as Becher and others. Becher (1989) writes that acceptance into a department to undertake postgraduate work is the beginning of formal initiation into the discipline as a profession. Choice of topic and research specialism vary from discipline to discipline but generally the stronger the contextual imperative, the less scope for negotiation. That the postdoctoral fellows were so aware of this aspect of their PhD candidature is not surprising as they have then gone on to enter academia and continue research. It is not clear however what socialisation means where students do not intend to enter academia, or have little chance of doing so, or are established professionals already.

For such students, some clarification of expectations and purpose could be important if the students' passage is going to be of optimal value to them. Such clarification and negotiation is part of being an active learner. The choices which are then made about a student's program of study and research will reflect the intent of the student and the experience and expertise of the supervisor(s). Such negotiation may continue throughout a student's candidature and can be seen as another level of discourse accompanying the discussion of research tasks and progress.

Supervisor Facilitation

Complementing the student data, the reported studies give a picture of supervisors who are supervising their students' progress with varying degrees of effectiveness. There are the examples of smooth passages. But even the experienced supervisors have some stories of rescues and disasters. The students have stories of supervisor behaviour which mirror this: supervisors who ease the passage and supervisors who appear distant and uncaring.

Since only the student can experience the passage, the question often asked is: what is the role of the supervisor(s)? It is common in the literature to focus on the roles and attributes of 'good' supervisors which are derived from student and supervisor reports. For example, a cursory reading of Chapter 3 would produce a simple list of the characteristics of a 'good supervisor' which is very similar to lists of what undergraduates often give as desirable features of a good lecturer:

- approachable and friendly;
- supportive, positive attitude;
- open minded, prepared to acknowledge error;
- organised and thorough; and
- stimulating and conveys enthusiasm for research.

Brown and Atkins (1989) also give a list of roles:

- Director (determining topic and method, providing ideas);
- Facilitator (providing access to resources or expertise, arranging field-work);
- Adviser (helping to resolve technical problems, suggesting alternatives);
- Teacher (of research techniques);
- Guide (suggesting timetable for writing up, giving feedback on progress, identifying critical path for data collection);
- Critic (of design of enquiry, of draft chapters, of interpretations or data);
- Freedom giver (authorises student to make decisions, supports student's decisions);
- Supporter (gives encouragement, shows interest, discusses student's ideas);
- Friend (extends interest and concern to non-academic aspects of student's life);
- Manager (checks progress regularly, monitors study, gives systematic feedback, plans work).

The difficulty with such lists as guides to practice is that although they are well meaning, they are very general and indicate little sense of the judgements involved in their application. It would be possible to debate the meaning of the descriptors above and contest

definitions (as the authors would want to do) without addressing substantive issues of practice. In contrast what stands out in the postdoctoral fellow portraits is the extreme variability and subtlety of relationships. The portraits confirm the need to look at the supervisor holistically. The students were seeing the supervisors as mixtures of strengths and weaknesses. Given that the students are also variable human beings then the relationships that emerge will be highly complex, dynamic and relational.

It is noticeable for example that the cue-conscious postdoctoral fellows were aware of the significance of the political influence of their supervisor for accessing resources, making contacts and future employment. From a student's point of view there can be a trading off of emotional support and influence. Not all students are looking for a 'guide, philosopher and friend'. In citing this description, Walford (1981), in his study of physics supervision, cautions against such use of role theory arguing that it leads to apparent consensus by staff and students and the elaboration of the supervisor's role as just given. Walford argues that 'the degree of simplification required to make any analysis of this sort in terms of role theory is so great that the resulting analysis omits much of what is important in understanding the development of the supervisor/student relationship and the degree of satisfaction felt by the student. In particular, the gathering together of opinions of students and supervisors who are concerned with an enormous variety of projects, from highly sophisticated theoretical problems to complex projects concerned with experimental design and development, means that to talk in terms of a single role misses the very aspects which may well give rise to dissatisfaction'(p.148). Certainly the detail presented in Part II would support this claim.

An alternative approach is to look at what the essential elements of supervision are by focussing on what supervisors are doing and why. From the interviews of experienced supervisors a model was derived which is presented in Chapter 5. It is not definitive. It is bound to provoke alternatives. What is critical is that it gives a framework for discussion and reflection. Important too is that it has reasonable face validity so that the focus can be on using it rather than dissecting it. The model interrelates goals, the supervisory processes and outcomes in a simple description which can then be contextualised and given meaning in different disciplinary settings, or industry related cultures or any other contexts including all dimensions, intellectual and emotional, of the passage.

It is in context that supervision must be discussed. It must be discussed around what students and staff are actually doing as researchers and how they feel and relate to one another, not in general terms about ideal behaviours divorced from the contingencies and pressures of the research task, and the variability of the human participants. Yet to do this there must be some agreement on some common essentials of the process, otherwise the endless variations are a barrier to communication and action. The model offers a framework

for exploring the variation productively without having to specify the variation in advance. The participants in the conversation can choose the content.

The surveys of staff and students provided some confirmation of the viability of this approach and the model. Questions of supervisors about student contact validated the bimodal pattern of contact proposed in Chapter 3, except for the Hard/Applied discipline cluster where the pattern of contact was constant. Similarly it was more common for students to seek assistance at the beginning and more common for staff to initiate contact in the later stage. This would suggest that the bimodality is a function of supervisor concern for completion and overlays another process in which students move from dependence to independence. It was noticeable that the postdoctoral fellows gave reasons for finishing which portrayed themselves as autonomous agents with no mention of supervisors. This interpretation is strengthened by the findings on student/supervisor relationships where there was a clear trend in all discipline clusters from teacher/student relationships to either joint researchers or departmental colleagues.

These and the other findings suggest that the differences which are often cited for science and humanities, are in fact variations on a theme. The responses to other questions confirmed the extent of variation and that it was variation on a theme across disciplines. Other significant effects were established on the basis of age, gender, educational background, linguistic status, position and responsibilities. The significance of these effects varied across questions and within responses to specific questions, which is to say that there were no discernible patterns on the basis of which supervision of PhD study could be established as a distinctly different process for a discipline cluster or group of staff or students.

The point of these conclusions however is not to emphasise what is common and to underplay the variation. On the contrary the findings in Part II support the argument for the infinite variety and complexity of supervisory relationships and add to our understanding of that complexity. What they do is strengthen the approach offered in this report of using a few key generic processes as a framework for exploring variation in context.

It is important to be clear for this purpose what the model is claiming to describe. It is a description of facilitation for the purpose of supervising PhD students. Facilitation is a useful way of conceiving individual supervisory interactions. It is useful if its meaning is taken to mean more than being supportive. This is an interpretation of the meaning of the word that has gained some credence but is not sufficient. More sophisticated definitions of facilitation offer an expanded view in which the capacity to confront and challenge are included. Such definitions are to be found in Boud (1985) and in Heron (1981, 1989). The latter author discusses issues of power and control in facilitation and educational relationships, a topic which is often never raised in such settings, but which some of the

students and postdoctoral fellows indicate has to be addressed. The work of Petersen (1992) is also of interest in this regard.

Restructuring Practice

The discussion so far has focussed on the individual students and supervisors. Such a focus has been common where the improvement of supervision is the topic. However another conclusion which can be drawn from the preceding discussion of variation is that there is a need to look for a structural response. This is particularly appropriate if the aim is to enhance the quality of supervision, not just make it more efficient and effective. For although programs to enskill staff and students in facilitation and learning may be appropriate as will be discussed in a further section, they are unlikely to be enough on their own to make a significant difference. Given the extent of the variation indicated and the need for students to find many levels and types of support, no one supervisor can be expected to provide all that is needed all the time to different students. Furthermore the students in practice are accessing a range of resource people to carry out the research tasks and for personal support, and some of their difficulties arise out of managing that complexity.

While this study focussed on best or better practice, stories or difficulties from poor practice did surface. Evidence of dissatisfaction with student supervision is well known as is dissatisfaction with supposedly traditional ways of providing supervision as was established in Chapter 2. There are matters here that require rethinking practice as opposed to strengthening what is in place. This conclusion fits well with current and emerging approaches to quality management in higher education (Dill, 1991). One of the aims of quality control is to reduce variation leading to errors. In industrial settings this has been achieved traditionally through inspection and other imposed control mechanisms. Such approaches are anathema in academic culture where there is a high value on individuality and autonomy. Current approaches emphasise a shift in thinking in all settings away from control to the concept of design. Quality is designed in, not achieved through controls.

Of course most institutions now have some mechanisms in place supplementing the supervisory process to ensure that certain basic requirements are formalised and regularised to prevent unacceptable inconsistencies and problems. Grievance procedures are one such example and these mechanisms are already in place at the ANU. They include guidelines which give advice such as on the clarification of expectations and possibly informal contracts. Margaret Powles (1993) suggests that these have importance as an expression of institutional commitment. On their own such mechanisms are not likely to be sufficient to improve quality in supervision as they deal with problems which have become acute or

offer advice which is very general. They do not show the way to quality in practice for the majority of students and supervisors.

It is for these reasons that the interest in restructuring graduate education arises as restructuring is about designing—in quality. It is about having structures in place which can affect the actual processes of education. To do this requires collective effort and co-ordination which may conflict with academic norms held by some staff. Alternatively such co-ordination for designing academic programs could be seen as a reassertion of the collegiality which has been weakened by the fragmentation of specialisation and competitive pressures.

It is in this context of the concern for quality that there is great interest in structural initiatives such as the panels, Graduate Programs and the Graduate School at the ANU. They are early examples of strategies to address issues of quality enhancement by redesign. It is all the more remarkable that the original proposal for the Graduate School came in 1976. In addition there are in place at the ANU Programs organised for such purposes which predate the establishment of the Graduate School. In Chapter 5 some of the experienced supervisors described centres at the ANU where with larger groups of students the programs operated as systems which co-ordinated all aspects of graduate studies. They are quite deliberately organised to provide more collective assistance and in all three instances the senior staff responsible saw themselves as avoiding the negative, as they saw it, aspects of highly individual arrangements which they had had some experience of in Australia.

The system of panels of supervisors across the University was introduced in the early 1980s. The Graduate School was established in 1988. Within the School there are Graduate Programs which are discipline based and in most cases include staff from different departments and Faculties/Research Schools (see Appendix A). However, as the views expressed in Chapter 5 demonstrate, the value of these structural initiatives is contested and some of the supervisors still see themselves as ‘traditional’ supervisors.

The surveys reported in Chapters 4 and 6 give some indication of how these new structures are shaping. Panels are working in various ways. What is of great interest is to find that the preferred mode of operation indicated by supervisors is different from that of students. Supervisors prefer to be a single supervisor or a principal supervisor with other supervisors and advisers available as needed, as indicated in interviews and in the survey. Students are more likely to prefer to see all their panel regularly. This finding strengthens the view of students as self organising learners looking for a range of resources. The difference in the supervisor and student perspective could also be explained in part by a process whereby staff and students each describe and respond to questions from a position of being at the centre of their universe.

What can most importantly be established from the survey of students is that student satisfaction with their supervision as a whole is often higher than their satisfaction with particular supervisors. Such a finding supports the contention that redesigning or restructuring graduate education to moderate the effect of individual supervisory relationships and enrich the educational process has promise for enhancing quality.

In respect of the Graduate Programs it is clear that they are being used by students as providers of seminars. Over two thirds indicated attendance at such events. However few were having direct contact with Program Convenors. It is not possible to interpret this from this study. Certainly a structure, however logical in conception, which is so recent and cuts across established boundaries could be expected to take some time to get established. From other evidence it appears that some Graduate Programs are working well. They also have the potential as suggested by one supervisor for implementing quality measures such as more initial assistance to students and professional development for staff. They are discipline based and therefore sensitive to much of the variation, but with sufficient numbers for viable programs. It is this last factor that is important and the rationale for looking to mechanisms such as these Programs.

The need for training for PhD students and supervisors is often raised as another strategy for achieving quality in supervision. The term 'training' unfortunately often refers to a very impoverished view of what can be done. A more productive perspective is to see it as a process of enabling and skilling those involved by strengthening their capacity to pursue their interests, learn from the experience as they go and identify and access specific skills, or other support such as counselling as appropriate. Ideally such enabling is not an add on to the process but an integral part of it. The model for facilitation discussed in an earlier section could form the basis of a program for supervisors which would encourage them to reflect on their experience and expose them to other alternatives. Given the variation in the current student population and the changing pressures on PhD education, there would be an argument here for a more reflective approach in the future, based on a wider experience base. Some exposure to pedagogy and principles of interpersonal interaction and communication would seem useful also for incoming supervisors. Moreover the interview material is full of specific strategies and ideas for dealing with problematic situations, as one would expect given the experience of this group. Any other such group would be bound to yield similar strategies and wisdom. One of the interviewees raised this issue and suggested that it might be possible to provide professional development within Graduate Programs.

Certainly the limitation of working from unreflected experience is that the supervisor is often reacting off past personal experience instead of the needs of the particular student who may be very different from themselves. Without any form of professional development

a supervisor may have a restricted range of strategies for dealing with the variation of individual students which is likely to be compounded when students also differ as regards national origin and gender.

Provision for the clarification of expectations and responsibilities is in itself a part of the enabling process. Where it can be done on a group basis it would be possible to address issues of power and control, and the legitimate interests of supervisors and students which may conflict at some times over some matters. It is essential that such activities take place in context and acknowledge the actual contingencies including disciplinary differences in work style and culture. But without any structure to coordinate it, such activity may make small improvements but will not lead to any rethinking of how to proceed. Again this is where something like a Graduate Program would be a useful mechanism.

Where changes are made in procedures and structures they too need to be supported by some developmental program. It was noticeable for example that the panels had been introduced as a procedure but with no such support. The varying views emerging in the studies are hardly surprising. The initiative requires new attitudes and skills to work optimally. What is needed is some program to explore the potential of the panel system in different contexts and the implications for supervisors who are now in a sense a part of an often diverse and even geographically scattered team. Without an institutionally sponsored program, the onus is left on the students in many cases to manage these groups.

Students can benefit from more attention at the beginning of their program of study, to alert them to the significant features of the 'passage' and to help them clarify their expectations, personally and as regards their supervisors. Various approaches to induction programs are possible from coursework which some programs at the ANU were offering, through the use of the masters coursework to more reflective programs designed to address the emotional and personal dimension as well as the strictly academic aspects (Phillips, 1984). The Graduate Programs in some parts of the university are providing some such structured support for students as well.

One route to improving quality is to improve inputs and much effort is put into student selection. The complexity of the human and disciplinary interactions and the importance of human idiosyncrasies would suggest the value of formalising the processes discussed by the postdoctoral fellows and enabling students to have more opportunity to select appropriate and compatible supervisors. Some are doing so already. More information from supervisors and the legitimating of students 'searching' among those available may prevent some difficulties. It would also signal a shift in attitude and a recognition of the mutuality of the process.

Rather than offer general advice on best practice or aggregations of specific strategies, the findings reported would suggest that each institution and even groups within institutions

should develop their own approaches but that they must address the issues raised. Students and supervisors need to consider all aspects of the passage and acknowledge the possibility of differing goals and outcomes. Institutions need to put in place structures to encourage quality in supervision which operate in a context that has meaning and in which students and supervisors are coordinated somewhere between the individual and the institutional system level.

Conclusions

In the initial stages of this project, the authors concluded that the identification of effective supervisory practice was best accomplished not through the simple aggregation of existing best practice, but rather through the deconstruction of supervisory practice and through the identification of those aspects of supervisory practice which would most benefit from strengthening, elaboration or change. There is little explicit suggestion in the literature that the one-to-one model of supervision is problematic. Most calls to improve supervision involve skilling the supervisors or providing extra support for students, which in itself assumes the model of one-to-one supervision. It is because this model is accepted so uncritically that on the one hand the very particular nature of supervision is constantly reiterated, and on the other regulatory approaches are offered—such regulatory approaches include compulsory training, accreditation of supervisors and grievance procedures. The reasoning clearly is that if supervision is so particular then regulating the individual is the way forward. Paradoxically the concentration upon the individual inherent in the claim that supervision is so particular is a reason too for academic staff to be very resistant to any ‘training’. Each case, the argument goes, is so individual that general precepts cannot be of any value or assistance.

In this report we have argued that such concentration on the individual relationships which obtain between supervisors and students is misplaced. This framing of the situation inhibits the accurate identification of problems and the implementation of the possible range of strategies to enhance quality in graduate education. Supervision should be seen as the total oversight by the institution of a student’s progress and broad academic development. Many people are involved: academics other than supervisors, Heads of Department, fellow students, support services, technical staff, and administrative staff. Students get assistance and stimulation from seminars, conferences and talking to visitors. Their concerns can range from theoretical matters to housing. The first conclusion which can be drawn from the studies reported upon is that:

Supervision should be conceptualised to encompass a broad view of PhD education which includes more than the one-to-one interaction of a student and a supervisor.

In his study of intellectual enquiry and the cultures of the disciplines, the British academic Tony Becher (1989) has argued that ‘the ways in which particular groups of academics organise their professional lives are intimately related to the intellectual tasks on which they are engaged’ (p. 1). One way in which academics organise their professional life is through the relationship which develops between students and supervisors and in line with Becher it is a commonplace in the literature on PhD education—and one readily acceded to by students and academics, both of whom often see PhD supervision as intensely individualistic—that supervision styles both do and should vary across the disciplines. While this report has focussed on the critical elements of supervisory practice within the context of disciplinary cultures, the analysis of difference, whether of disciplines or individuals, has then been pursued to distinguish between what is common or generic and what is specific. Emphasis has been given to establishing the extent and nature of the variation so that practice can be contextualised without losing sight of considerations of good pedagogy which are common. This approach is in contrast to attempts to derive patterns of supervisory practice common to particular groups or disciplines, such as the humanities. Our second conclusion therefore is that:

Programs for staff and students to improve practice can and should be designed to contextualise the generic processes of supervision with attention to disciplinary and usual human variation.

While previous studies have raised aspects of the context in which the primary relationship is transacted which can be made more favourable, (Moses, 1989; 1992; Phillips, 1993; Sheehan, 1992); the environmental matters are presented as in addition to or in some sense separate from the supervision process itself. The assumption of the primacy of the individual relationships which obtain between students and supervisors may in fact account for some of the difficulties in to significantly improving graduate education. As a consequence of this assumption many of the suggestions of previous studies for improving graduate education may have fallen not so much on deaf, as on impotent, ears in that the individual supervisors to whom they have been addressed may not have been the appropriate locus of power through which such changes could best be made. For sharing and co-ordinating responsibility for quality in supervision becomes important for improving practice when supervision is conceived of as encompassing the total oversight of a student’s progress and broad academic development. Structures such as panels involve such a sharing; programs where there is a critical mass of students can involve other forms of sharing and co-ordination. Graduate schools are an attempt to provide an institutional response and focus of responsibility for assuring quality.

There is a need to go beyond individual supervisory interactions and restructure practice to ensure that responsibility for quality is shared and co-ordinated.

8. RECOMMENDATIONS

Restructuring Practice

Ensuring effective graduate education requires restructuring practice so that the process is not reliant solely on individual supervisors or students, their skills and personal attitudes. Restructuring can be achieved by various strategies such as:

(1) The establishment of supervisory panels.

Panels allow students access to a broader range of skills and expertise as well as allowing them to be socialised into different intellectual cultures—through the appointment of supervisors from industry, for example. Panels also allow for a robustness in supervision in that they help to alleviate problems which arise through individual interactions or through changes of personnel.

(2) The concentration of students in groups of sufficient numbers.

Groups of sufficient size provide greater opportunities for peer support as well as enabling both more systematic attention to be paid to students' needs and the efficient development of skilling programs. Where departments attract insufficient numbers groupings such as the ANU's Graduate Programs allow critical masses of students to be concentrated. If such Graduate Programs are 'grown' organically so that they reflect current research considerations and alignments, this ensures that students are socialised into the present rather than the past. The discipline nature of Graduate Programs also ensures that the policies and procedures governing graduate education within institutions are developed and administered in ways appropriate to the research cultures in which students operate.

(3) The establishment of institutional structures to encompass all graduate education.

Such institutional structures can initiate, facilitate and co-ordinate strategies and policies at a system level to enhance the quality of graduate education. Structures

may vary but they should offer an institutional focus and signal a commitment to quality.

(4) The introduction of a more structured induction period for students.

Because of the double task which students face—doing the research while at the same time learning, technically and ideologically, both how to research and in what research consists—PhD education needs to be restructured in order to better allow this socialisation and learning to occur. One possible restructuring would be the introduction of a discipline based structured induction period at the commencement of the PhD. Such a period would assist students to make the move from reproduction and analysis to speculation which is at the centre of the PhD. It would also allow students to meet and observe potential supervisors and to develop research proposals systematically and with proper oversight before committing themselves to the research proper.

Individual Supervisory Interactions

There is little doubt, however, that the individual relationships which develop between students and academics have an impact which is a major factor in determining the quality of the educational experience for the student. Strategies must therefore be developed to improve the effectiveness of these relationships in the context of other institutional strategies and in ways that ensure that staff and students find the supervisory experience productive. Such strategies include:

(5) The provision of professional development for supervisors.

Such professional development could begin by introducing opportunities for supervisors to reflect upon their practice and to extend their range of skills in facilitation. To this end, the institution should demonstrate its recognition of the importance of supervision through the provision of appropriate rewards to supervisors for the work which they do—for example, the inclusion of supervision in workload calculations. These rewards should reinforce the intrinsic satisfaction gained from supervision.

(6) The structuring of the clarification of roles, responsibilities and goals by supervisors and students to endeavour to make the process mutually rewarding to both parties.

This can be accomplished by ensuring that supervisors realise and accept that they do not have sole responsibility for the oversight of the student's progress but rather that they are part of an overall supervisory structure with particular roles and responsibilities; and ensuring that students are aware both of the variety of other

teaching, research and administrative responsibilities which supervisors have and of the other institutional support structures which are available to students.

Study after study has shown that large numbers of students are dissatisfied with their individual supervision and yet this level of dissatisfaction does not correlate well with final outcomes, although it may correlate with delays in submission. In this study a more appropriate measure of satisfaction—a measurement concerned with the overall effectiveness of the total supervision received by the student—has been developed in line with current trends in the measuring of student satisfaction, and the use of such measures as indicators of teaching ability, at undergraduate level. This measure appears to correlate better with final outcomes and could be usefully adopted at other institutions. In order to be better able to measure the effectiveness of the supervision—the total oversight of the student's academic development—which they are providing, universities should:

- (7) Adopt measurement strategies which measure the overall effectiveness of the total supervision received by the student.**

Undertaking Further Research

The strategies suggested in this report are not encyclopaedic. Further study could be efficaciously made of strategies employed at institutions other than the ANU in order to illuminate the theoretical points made in this report and, of course, to test the validity of the report's broad conclusions. A further area of study raised by the conclusions of this report is the question of the articulation between undergraduate and graduate education and in particular the role and usefulness of broad academic coursework, and structured induction, in the PhD. In this report we have seen that the ages, genders, national and linguistic backgrounds, and educational background and responsibilities of students and supervisors all impact upon the PhD experience but we have not attempted to determine which of the effects of these variables are 'real' and which are artefacts of demographic imbalance between, for example, the disciplines. We therefore recommend that:

- (8) Further study should be made of strategies employed at institutions other than the ANU.**
- (9) Further study should be made of the articulation between undergraduate and graduate education.**
- (10) Further study should be made of the effects on the PhD experience of the ages, genders, national and linguistic backgrounds, and educational background and responsibilities of students and supervisors.**